



FRIDAY, JANUARY 17, 1896.

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Contributions.

The Telephone on the Brooklyn Bridge.

JAN. 7, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the issue of your journal of Jan. 3 was a notice of the recent trial of telephones on the New York and Brooklyn Bridge, as a means of communication between the train dispatcher and the moving trains. The statement of time passed in displaying the signal at the Brooklyn end of the suspended structure was erroneous, and presumably was from the reports in the daily press. The facts are as follows:

A single telephone was on one of the cars of a train running from New York to Brooklyn; the other was in a switch-house at the foot of the grade, in which is the lever directing a block signal, well up on the grade down which the car was running. The signal was in sight from the car on which was the telephone, and the exhibition of the disk would be instantly noted therefrom. When the order was given from the car to drop this signal, in four seconds afterward it appeared, and in ten seconds following the train was brought to a stop. That is, in 14 seconds from the time the order was given from the car, through the telephone, to drop the signal, the train was halted.

KINGSLEY L. MARTIN,
Asst Eng., N. Y. & B. Bridge.

A Chance to Advertise Locomotives.

THE UNIVERSITY OF ———, Jan. 11, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am hoping to get our people to put in a plant for shop tests of other people's locomotives, possibly like the C. & N. W., at Chicago. We have the invitation to make, as soon as warm weather comes, some quite extensive road tests up here. I wish some locomotive builder would think it a good advertisement to give us a locomotive.

PROFESSOR.

[We wish so too. It would be a good advertisement for a locomotive works and would do a great deal to advance the science and art of locomotive engineering. The school in question is young, vigorous and well organized in its mechanical department and is destined to have great influence in one of the most enterprising portions of our country.—EDITOR RAILROAD GAZETTE.]

How to Get On.

PHILADELPHIA, Jan. 8, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following letter is an example of an application for position that is worth reading as saying enough and not too much. It is an actual letter that has come to my notice, and it resulted in the writer obtaining an excellent position exactly to his liking. He is now a well-known man, having risen very quickly to prominence. I have changed names and places to prevent any embarrassment, for the letter is not old. The "Hyphen-Corliss Engine Works" is one of the largest and best in the country. "Mr. Judson" is the genial head of another company owning several engine works, well known but somewhat smaller. He was a stranger to the writer. "Mr. Massé" is known all over the country as a mechanical engineer, at the head of his specialty.

T. X.

THE HYPHEN-CORLISS ENGINE WORKS,
MECHANICAL ENGINEER'S OFFICE.

SUBJECT: Inquiry in regard to Position.

MR. ADONIRAM JUDSON, Supt. of ——— Company,
New York City:

DEAR SIR: I am in the employ of the above works under Mr. Arthur Massé. I have a two-weeks' vacation which I shall spend at Narragansett Pier, but am coming to New York first to meet my wife. [That implies stability.—T. X.] Shall be there Thursday afternoon,

Aug. 15, and Friday forenoon. Should like to call on you, show some former letters of recommendation, and prints of some of my drawings here, and tell of my work, and see if you have some opening for me better than here, where, by the way, I know I am desired to remain.

Briefly, I graduated from Princeton, and then spent four years with special opportunities in the Jones shops, evenings in drawing school. Then went to Ermina College of Mechanical Engineering, took First Regent's Prize, as head man, received degree, became junior member of American Society of Mechanical Engineers, was offered a number of positions, came here two years ago under Mr. Massé, was put upon the designing of that navy yard engine. Her cylinders' sizes, ports, steam distribution and valve gear were mine. I make a specialty of scientific, simple valve gear designing, steam distribution, compound and triple expansion engines. Have been out indicating plants up to 1,400 H. P. Have been sent to Chicago and other cities on company business. Have contributed somewhat to the technical journals; you may have seen my long article on "Blast Furnace Blowing Engines." Went to Europe in 1890 to make a study of engine design, my salary continuing during my absence of five months.

There is, as I knew when I came here to get familiar with Hyphen-Corliss practice, no official advancement for a technical man who does not serve the routine five years' apprenticeship in the Hyphen-Corliss shops, etc. My Jones shop's experience doesn't count. I wish now to have a position where there is a prospect of rising.

May I call upon you Thursday afternoon, Aug. 15?

Respectfully yours,

STEPHEN TRUAX.

P. S.—You will of course appreciate that this is a confidential letter. I inclose a self-addressed envelope.

American Society of Civil Engineers—Annual Meeting.

The 43d annual meeting of the American Society of Civil Engineers was held in New York City Wednesday and Thursday of this week. We go to press too early in the week to permit a detailed report of the meeting. One of the most important things accomplished was the election of officers for the coming year. Those elected are as follows:

President, Thomas Curtis Clarke, New York City.

Vice-Presidents, William Rich Hutton, New York City; Peter Alexander Peterson, Montreal, Can.

Treasurer, John Thomson, New York City.

Directors, George Alexander Just, New York City; William Barclay Parsons, New York City; Horace See, New York City; John Ripley Freeman, Boston, Mass.; Daniel Bontecou, Kansas City, Mo.; Thomas William Symons, Portland, Ore.

The official programme follows:

Wednesday, 10 o'clock, a. m.—Annual reports read, officers elected, time and place for next annual convention considered, and general business transacted.

1:30 p. m.—Lunch at the Society House and the meeting resumed.

2 p. m.—An address by H. W. York, Jun. Am. Soc. C. E., on the Central Station of the United Electric Light & Power Company, 407-419 East Twenty-eighth street, New York City. This station was open to the inspection of members during Thursday afternoon.

The station is designed for 20,000 H. P. The building for the first 10,000 H. P. is now practically complete, and a plant of 5,000 H. P. is in operation. The engines and dynamos are in 1,200-H. P. units, and the boilers in 600-H. P. units. Over the boiler is a coal bunker of 3,000 tons capacity, which is filled by a conveying apparatus taking coal from the sidewalk. The boilers, engines, dynamos, pumps, etc., are all carried on foundations resting on solid rock, and are all on one floor, and yet the entire plant of 20,000 H. P., including storage for 6,000 tons of coal, will occupy, when completed, a plot of ground but 160 ft. 11 in. by 197 ft. 6 in. It is believed that engineers interested in central station design will find it worth while to spend a short time looking over this plant.

Thursday, 9:30 o'clock a. m.—A special train on the Delaware, Lackawanna & Western to Ampere (about 10 miles), where, by invitation of the Crocker-Wheeler Electric Company, S. S. Wheeler, M. Am. Soc. C. E., President, an opportunity was given for the inspection of the new works of that company. A description of these works is printed elsewhere. Return for lunch at the Society House.

Members and guests were invited by C. C. Martin, M. Am. Soc. C. E., Superintendent and Chief Engineer, and G. Leverich, M. Am. Soc. C. E., Mechanical Engineer, of the New York and Brooklyn Bridge, to visit that structure.

By invitation of H. W. York, Jun. Am. Soc. C. E., Chief Engineer of the United Electric Light & Power Company, members and guests had an opportunity of inspecting the new central station which this company has erected at Nos. 407-419 East Twenty-eighth street.

Eight o'clock p. m. a reception at Delmonico's, with dancing and supper.

The Works of the Crocker-Wheeler Electric Company.

Thursday morning many of the members of the American Society of Civil Engineers attending the annual meeting in New York, visited these works, a description of which follows. The use of electric power for driving machinery is especially important and interesting.

The new works of the Crocker-Wheeler Electric Company are situated at Ampere, N. J., on the Montclair branch of the Delaware, Lackawanna & Western Railroad, just beyond the limits of the city of Newark. The entire plant is new, having been rebuilt this summer on the site of the old works occupied by this company.

*The owner of the works had at the start frankly advised him not to enter their beautiful routine of advancement, but stay barely long enough to learn and then strike out for quick promotion elsewhere.—T. X.

which were formerly the works of the Spiral Weld Tube Company. The new buildings are of the modern slow-burning mill construction, and have been erected practically in accordance with the plans of the New England Mutual Insurance Companies.

The principal engineering feature is the electrical power transmission system, which is employed throughout, whereby the power required to operate the works proper is reduced to 25 H. P. from 100 H. P., estimated. All of the machinery is operated by individual motors built into each machine, or by separate motors, each driving a single length of shafting, which in turn drives as many of the old-style machines as can be conveniently belted to it. The result is, first, that all power used in connection with these machines is stopped whenever the machine is out of use, and second, that the works are free from belting, leaving them remarkably light and clear for handling material. As most of the tools are fitted with their own motors it is easy to shift them from place to place frequently, as it is unnecessary to line them up to any system of shafting. In addition to the

remarkable reduction in power required for operating the plant, this method of driving gives a shop system of great flexibility. This was well illustrated during the past summer, when many of the company's machines were operated in their original positions in the ruins of the old works which were burned, under temporary covers, by means of temporary wires run to the motors built in them. The machines were afterward from time to time moved from one position to another as the work on the new buildings required, being kept, however, in continuous operation day and night. By this means the company turned out 20 per cent. more product this year than ever before in its history, in spite of the fact that for three months the entire plant was in ruins.

The lighting and power for the plant are supplied by a 150 H. P. Corliss engine driving an 80 kw. dynamo in the detached power-house. The current is conducted from the power-house by a pair of cables through an underground tunnel, which also carries the heating pipe and the cables for experimental work through the cellar of the office building, thence rising from a manhole under the floor of the main shop and running along under the roof on ordinary trolley-line insulators to about the center of the shop, where they terminate on suitable slate panels. From these branch out four sets of wires carried in a similar manner along the roof trusses and extending through and feeding the four quarters of the main building. By this arrangement the supply of power for either section of the shop can be readily discontinued by opening a small switch.

From the switchboard run also the circuits for supplying the other buildings. The branch connections from the main circuits are carried down the inside of the cast-iron columns of the building to a point about 6 in. below the surface of the floor; thence they are carried along through small wooden troughs, which were laid for this purpose in the concrete, straight across the shop close to the bases of each pair of columns, or 10 ft. apart. The wires are brought up from the troughs through the floor wherever connections are desired, through 1-in. holes bored through the flooring. The wires pass into and out of the centers of the columns through small hand holes cast in them near the top and bottom. The columns are supported on cast-iron bases resting on suitable masonry foundations, but the joints between the columns and their bases are about 1 ft. above the shop floor, to facilitate the leveling of the columns by wedging, if it should ever become necessary to preserve the level of the overhead crane track.

The king posts of the roof trusses are extended upward so as to furnish posts for the roof sign. The main building is 100 ft. wide and 450 ft. long, the office building adding another 50 ft. to the length.

In the construction of the buildings it was decided to use a floor heavy enough for the foundations of any machinery it was desired to put down at any part, and which would also permit the carrying of heavy loads on roller trucks rather than to introduce hand-car or industrial railroad tracks, since this would greatly cut up the floor and could not be arranged to reach every part and avoid interference of two cars on one track. The floor consists of 4 x 6 in. chesnut sleepers laid in Portland cement concrete, with a finishing coat laid on by trowel and treated on top with tar. On this is laid 2-in. spruce planking, and on this 1½-in. finished maple.

The ordinary construction for the side trusses of a roof was also departed from in order to furnish trusses, the lower members of which would be strong enough to support trolleys for hoists of a capacity up to 4 tons, and it was found by Messrs. Post & McCord, the engineers of the building, that by the use of 15-in. light I-beams for the under members of the lean-to trusses, and a very light angle iron for the upper members supported by vertical pieces of angle iron, the roof trusses could be made with very little increase of weight, and with a lower member that would easily carry a large and powerful hand hoist. These roof trusses are 10 ft. apart. The same principle was applied to the roof of the engine-room in the power-house, where it was desired to support a 6-ton traveling crane on the roof trusses, and extend over a stretch of 45 ft., or four trusses, as this would avoid the presence of any columns.

The office building is designed with special reference to facilitating the work of the Engineering Department and the management of the company. The general offices and the office of the chief engineer and assistants are on the main floor, with connection directly to the

floor of the shop. The workmen's entrance, also on this floor, is so arranged as to make the men pass through the Bookkeepers' Department. The second floor contains the Drafting Department, blue print and photographers' rooms, library and the toilet and locker rooms. The third floor will be for assistants and storage. One-half of the basement is arranged for a laboratory for such experimental work as it is desired to carry on without disturbing the shop; the other half is for bicycles. Up through all of the floors extends a fire-proof vault about 10 ft. square, with arched brick floors and air spaces on all sides, for the reception of the records of each department.

Air-Brakes on Freight Cars.*

MR. G. W. RHODES (C. B. & Q.): I found that before I had got through the first page of the paper I felt disposed to take a different view from what the author did. But as I know the Lake Shore people are generally pretty well posted, I thought it would be a matter of prudence to get some facts from men who are closer to the detail than I am before forming any opinion. I therefore addressed a letter to several of our superintendents, stating the main points made by Mr. Waitt and saying, would you kindly write me what your experience in this matter has been, and in case you have met with the difficulties attention is called to, in this paper, please say what if any remedies have been applied? We would also like to know how many trains have been delayed on your division during the month of November through bursted hose, or, if there has been no delay from this cause, about how many cases of bursted hose have been reported. We would like this hose record also for the month of December up to date of your reply.

[The detailed reports do not give many facts that could be summarized, but the general result is that the advantages far outweigh the disadvantages of the air-brake, even in trains partly equipped.—EDITOR.]

From these reports, and knowing the care and attention that has been given to the subject of air-brakes on freight trains on the C. B. & Q. for the last 10 years, it seems to me that the conclusion we would draw is, that the reports rather favor Mr. Waitt's conclusion on page 164 of our November proceedings.

These reports again make prominent the fact that the link and pin couplings are not a safe thing to use with air-brake cars. Roads that have always applied close couplings when they applied air-brakes have followed the proper course.

The attention called to the importance of looking after new equipment in the application of brakes is timely, but it is only fair to say that there are roads that do give it a great deal of attention, and when new equipment is built they have their air-brake men at the shops with special instructions to look after and attend to the application of air-brakes. The blowing out of the pipes to get rid of scale after they are bent to shape is very important. We have here a couple of photographs showing an ingenious air pressure device that was gotten up at our Aurora shops by two of our foremen, Messrs. Hubbard and Cuthbert, for quickly bending pipes, and at the same time cleaning them. [Cuts not reproduced.—EDITOR.] The interesting part of the device is that in releasing the air from the cylinder it is connected so that the air exhausts through the bent pipe, blowing out all scale and dirt collected inside. With this arrangement air-brake pipes are bent with a minimum expense in labor and a minimum expense in cleaning.

We are prepared to endorse everything that Mr. Waitt says about the importance of keeping triples clean. We do not quite like the comparison, however, of a triple with an expensive watch. While it is certainly important that the triple should be kept clean, we think that one of the great features about a triple valve, and one of the things that make it successful, is the tremendous amount of abuse it will stand and still work. If you will refer to a report of this club in 1894 (on page 150), you will find there that it is a matter of record that a triple valve will charge a reservoir in about three minutes to 70 pounds air pressure through a quarter inch pine block, and also a quarter inch red oak block. The further interesting fact is, that you can apply the brake also by letting the air escape through these blocks. While this does not justify maintaining triple valves in a bad condition, I think we ought to accept it as a comfort, in the introduction of brakes on freight cars, to know that they will work under such very adverse circumstances.

No mention is made in Mr. Waitt's paper of the irregularities we have had in the matter of inch hose applied to inch and a quarter train pipe. There is a great deal of trouble from that at interchange points. There is so much inch hose getting onto cars that I have thought that some railroads are buying inch hose when they ought to buy inch and a quarter. This causes a great deal of trouble to many roads, because the roads in the East refuse to take inch and a quarter pipe and inch hose. To give you some idea of the extent to which this is carried on, I have a report from the Quincy inspection on the C. B. & Q. road for a few months past, showing 168 cars with one and a quarter inch pipe and fitted with one inch hose.

To aid in remedying the matter on the Burlington road, we have given instructions that no more inch hose are to be fitted with this nipple (exhibiting a straight nipple). This is the nipple which fits into the inch and a quarter plug. Our inch hose are applied to the small angle nipple used in connection with the straight plug, of which I do not have a sample here.

On page 167 the suggestion is made that train men be furnished with necessary wrenches for tightening all unions and fittings, and it seems to me that it is a suggestion that is worth a good deal of attention. We offer this suggestion: That if any road engines are not furnished with such wrenches, it would be a good plan to commence equipping the engines. The way car would be a long way off in many instances, and air-brake cars being on the front end the engine would be the most accessible point to get the wrench from.

On page 168, in about the middle, we find this: "All cars taken on trains between test stations, and all cars not marked to show a previous recent test on same road, should be placed on test tracks and properly cared for." I quite agree with the author about this. Chalk marks are cheap, and are no indication of the condition of the brakes.

There is a feature, however, of maintaining brakes, which is not alluded to in the paper, and which is quite important. On page 274 of the Master Car Builders' 1894 Annual Report there was a very complete report made to the Association on the maintenance of brakes,

and among other things recommended was the use of air brake cards to be applied by trainmen and others when brakes are in imperfect working order. I have here a number of cards, which are in use on the C. B. & Q. The use of cards is recommended by the Association, and we consider them of very great value in properly maintaining air-brake cars. There is no one more interested in having the brakes in proper shape than the trainmen. When you want to get your brakes into first class order you cannot enlist in the service any better set of inspectors than the conductors and brakemen. They will put these cards on every time that a brake is out of order. The card remains an advertisement, and when the superintendent goes over the line he can see how many cars are running with brakes out of order. The result is that when air-brake cars go into the inspection yards, with these cards on, they are placed on the bad order track and put in order at once. If they are not put in order, the cards very quickly tell the tale. Every railroad should use these cards.

In regard to hose failures, I won't enter into that discussion very much; but there is one feature I would like to call attention to, because it is one that I do not believe has had quite as much attention as it ought to have. At a meeting of the New England Railroad Club, held in Boston, Nov. 12, Mr. E. G. Desoe, presented a paper stating that "the most common cause of stoppage in the train line is by the closed angle or stop-cock placed in the train line at either end of a car." I have here a sketch of the stop-cock, showing it in sections. You will observe there is a spring immediately under the plug. We find that, from its location, by some one pressing on top, or occasionally stepping on it, the weight bears the plug down, and if there is dust or grit here, when the spring lets go the plug crowds into the dust or dirt, making it very difficult to turn the plug. As a result, a link or pin is often taken to hammer the handle around, and we find from that the hose is often quite seriously damaged by being struck. Also, sometimes a drawbar pushing upon another drawbar will crowd against the stop cock and on account of its position damage the hose close to the nipple. In order to be sure that this was not an unusual case, I got further samples. Here is another, showing the same character of damage, and the handle, you will notice, is brought down quite close. This handle does not work so very hard, but in some of them it is impossible to work the handle. This third one also has the hose destroyed at the nipple and the handle broken off; and of course with so short a handle you cannot budge the plug except with a hammer. This drawing shows how it is possible in case the deadwood becomes loose, or the attachments become loose, that gradually working against the plug or handle may close the pipe. We had a case not very long ago on the C. B. & Q., where a freight train had a plug mysteriously close three different times on one trip. Finally the trainmen discovered what caused the trouble. A draft timber was loose and rubbed against the plug, which turned the stopcock.

The question of guarantees on hose is one that has had a good deal of attention recently, but I think some of the methods of carrying the guarantee are inefficient. Here is a comparatively new hose. If you examine it you will find that the dates are already rubbing off, and the probability is that in the course of a year and a half the record carried on this particular hose will be of no value. Some railroads are going to a good deal of expense in using a wire-wrapped hose. Here is a comparatively new wire hose, but you see it has not escaped damage. It has been torn in two. The hose is useless, although it is quite new. It has some kind of a tin record, but the record is already illegible and twisted up so as to be worthless. Here is another wire hose. How it became damaged I do not know. Wire hose must be more expensive than ordinary hose and I doubt their efficiency.

MR. DAVID L. BARNES, M. E.: The valuable lesson from Mr. Waitt's paper teaches that air-brakes must receive intelligent care. This fact should not be a cause of surprise, as all known structures are subject to deterioration. Most railroad men who are trying to get the full value of air-brakes have found that frequent, honest inspection is the only sure cure for defects. It is of the greatest importance that all should be impressed with the practical fact that air-brake apparatus must be watched quite as much as wheels, axles and other parts on which the safety of trains depends, but it is not clear why it is useful to discuss the question of the comparative damages that are possible with hand-brakes and with powerful air-brakes, and with non-automatic and automatic brakes. The quick action automatic brake is necessary for the safe operation of long freight trains, and if its use brings new evils useful investigation must, in the end, be confined to a consideration of the ways and means to reduce them. That is, the question is, not how to do away with the automatic quick-action brake, but how to reduce the evils that may come from its use.

So far all the incidental troubles from automatic brakes have been reduced or removed by inspection, and roads with well organized repair departments report no difficulties of real importance, except those arising from the careless handling of the engineers' valve. Occasional reports are received where a broken car coupler permits the trains to part or a hose bursts, and then all the evils that Mr. Waitt's paper tells of are liable to follow.

This leads naturally to the conclusion that railroad men and purchasing agents must cease to look upon a hose as a round piece of rubber which is "good enough" if it will stand a pressure test, and upon a coupler as suitable if it weighs 220 lbs. and is backed with a guarantee and a low price. Well might railroads bewail the fate which compels the use of an automatic brake if strong couplers and durable hose could not be found, but as both are offered in the sharpest of American competition, there is no cause for grief about the conditions imposed by modern brake service. It is clear that there is a chance for introspective examination by each road of its own practice to learn if any really useful steps are being taken to select good couplers and good hose.

If we are to judge by the experience on other roads, Mr. Waitt's trouble can be cured by using the proper quality of hose and lots of it, so that no car shall leave an inspection point with a suspicious looking hose or coupler. This may temporarily increase the cost of air-brake repairs, but this increase will be repaid by the saving in wrecks where the condition is as bad as Mr. Waitt's paper describes. In the future one may trust that all roads will use good hose and couplers and that inspectors will be able to pick out all defective hose during a rapid inspection; meantime what is needed is a good standard test for hose and a standard requirement for car couplers that will rule out the abominable combinations of rubber and cloth now sometimes sold for air-brake hose, and set aside some of the cast-iron couplers now offered as malleable. With these standards all can select proper material to prevent wrecks from parted trains, but without them it is as difficult for the purchaser to make a proper selection as it is for the manufacturer to suit the ranging requirements of the present miscellaneous specifications.

MR. J. F. DEEMS (C. B. & Q.): This morning we looked over 168 burst hose and also a lot of hose other-

wise defective. Of the total number of burst hose examined, nearly three-fourths, or 71 per cent. of them, fail at a point between the center and the pipe connection, and one-half fail within 3 in. of this connection. In many cases the rupture would occur where there seemed to be a lap or seam in the ducking. This was especially noticeable in hose where this seam runs parallel with the hose, and the fittings are put in to bring it on the outside of the curve when the hose is coupled up or hooked up in the dummy couplings. But where the seam was on the inside the effect was not so marked. It would seem to me that in putting the fittings into hose that show this parallel seam something might be gained by putting them in to bring it on the inside of the curve. Some of the hose inspected seemed to have a piece of ducking about three-fourths of an inch wide wound spirally just underneath the outside rubber coating, and in most of these cases rupture will occur at the edge of this narrow piece, and parallel with it.

The evil effect of the dummy coupling was plainly shown, and doubtless in a great measure accounts for the 71 per cent. of failures near the pipe fitting, which is rather at variance with Mr. Waitt's statement when he says that hose fail "without exception" on account of the effects of heat and cold; but it emphasizes the importance of his suggestion in the same paragraph about strengthening or reinforcing the hose at the ends.

MR. J. N. BARR (C. M. & St. P.): I think Mr. Waitt's paper is about as pessimistic as Mr. Barnes' is optimistic on the subject, and I think, too, that in a number of points the real cause for the difficulty has not been ascertained. Now, I feel a little strongly on this subject, because we have recently been put to considerable expense paying for hose replaced under our cars, and I made up my mind to look a little into this matter, or to look carefully into it, in fact, and see what amount of damage we could attribute to burst hose. We have followed this thing up now so closely that we can say almost to a cent how much damage is caused to our rolling stock from wrecks, derailments of trains, or any other cause or casualty while on the road. I took this record and went over it carefully from Jan. 1, 1894, up to the present time, and I find that the damage charged to hose bursting was \$260. We have had a number of expensive cases of damage from trains parting, but they have not been attributed to hose bursting; and I think there is where Mr. Waitt and I differ on this point. Now, Mr. Waitt has been making a very careful examination of hose, and in the last six weeks we have received notices that will cost us about \$50 for hose removed from our cars on account of being in imperfect condition. It may be all right; but it is strongly impressed on my mind that it has cost us \$50 for removing hose which was said to be imperfect, an amount about twenty times as much as it has cost us on our road for actual damage from burst hose. I am satisfied that the amount of actual damage from hose bursting is almost infinitesimal.

Nine-tenths of the damage to cars on our road arises from trains parting and coming together, and there the air-brake comes into very serious play. This is too important a matter to let drop, I think, with a few hours' talk on the subject.

I am inclined to think that, with the test that trains receive from the air-brakes applied before they go on the road, if that test was 15 or 20 lbs. higher than the service work on the road, it would meet every requirement and detect every burst hose in ample time to prevent any damage on the road—and that test could be very cheaply applied. It seems to me that that would give a margin that would almost guarantee against loss from hose bursting on the road.

There is one thing which has been a cause of serious accident, and that is the application of the brakes in close succession—making two applications within a short time before the train can be recharged. It is for that reason that I feel very much inclined to say that, while we should run our air-brake cars at the head of the train, and maintain the air-brake there, under no circumstance should the air be applied except in the case of emergency. It seems to me that it would be almost necessary to have a rule that, when an application was made, a proper pressure should be secured in the train pipe before the train proceeded.

Now, take again the case of stopping engines at a water tank. I believe, and think I have the data to show, that there has been more damage by a thousand times done by stopping trains at water tanks with a small number of cars equipped with air at the head of the train, than has been done by all the burst hose that ever existed. The difficulty there is simply this: You endeavor to stop the engine at an exact point; the train does not stop quite there, the emergency is applied, and the rear of the train comes up, with the results that everybody has been familiar with since the experiments on the C. B. & Q. some five or six years ago. If we are to use air for stops at water tanks, the only safe way will be to be sure you stop before reaching the tank, and then crawl up, and use the reverse lever. I don't believe it can be done in any other way. The same way with switching trains. I will put myself on record in saying that it is impossible to switch a train of 20 or 30 cars with 8 or 10 air cars ahead, without running the risk of, or without actually, breaking couplings at almost every switch, and I do not know but what that has been impressed upon the minds of every one that has been observing these points.

This question of air hose is a very important one. A road with an equipment of 20,000 cars requires 40,000 hose, which cost \$40,000. If these hose last only two years, you have got there a fixed expenditure of \$20,000 merely for maintaining the hose. Now if the rigid inspection which has been proposed in this paper were carried out, I have no doubt but what a great many hose that we now run indefinitely, would be removed on account of indications of cracking, etc., that might otherwise give a considerable service. By making a cast-iron rule of this kind, we can very easily put an expense on our companies, not only of thousands but tens of thousands of dollars, and I question whether we would really get one cent in return for it. That is the special point I want to make in connection with this paper.

MR. G. W. RHODES: Our actual data would practically confirm Mr. Barr's estimate, as we found for the year ending September, 1894, we had paid \$12,000 for hose, and for the year ending September, 1895, \$8,000 for hose, on about 7,500 cars. Our investigations point to the fact that the hose failures were largely due to the kinking of the hose. In 1893 and 1894 we had a very rigid rule on the C. B. & Q. road, requiring all hose to be placed in the dummy couplings. The dummy couplings were really made use of on the C. B. & Q. Finding out this large expense which we were incurring in hose, and noticing that they ruptured frequently where they were kinked, the first reform that we made was to do away with the dummy and let the hose hang straight 4 in. from top of rail, and we believe this is one of the reasons that we have had fewer hose fail in the last year.

[TO BE CONCLUDED.]

Mr. Thomas Curtis Clarke.

It seems almost superfluous to introduce to our readers the President-elect of the American Society of Civil Engineers, Mr. Thomas Curtis Clarke. His face has been familiar to two generations of civil engineers on both sides of the ocean. A great many of them have been charmed by his "flowing courtesy," and his work is a part of the history of the profession in the United States.

Mr. Clarke was born in Newton, Mass., Sept. 16, 1827, and is a brother of that very eminent minister, the late Rev. James Freeman Clarke. As a lad Mr. Clarke was a pupil of the Boston Latin School, and was graduated from Harvard in the class of 1848 and was the class poet. He has always kept his interest in literature and in the liberal arts, and, like the late Eugene Field, he has translated several of the odes of Horace.

His special studies in civil engineering were under Capt. John Child, of Springfield, Mass. In his early life he was engaged on various railroad work, but soon took up bridge engineering as a specialty, although he has continued to pay careful attention to a great variety of engineering and has been, and still is, frequently consulted in important work other than bridge work.

One of his early works was the second railroad bridge across the Mississippi River, that of the Chicago, Burlington & Quincy, at Quincy, Ill. This bridge Mr. Clarke built without the intervention of contractors (except for the iron work). He designed all the machinery and plant, and was so successful that in spite of a season of unusually high water, he opened the bridge for traffic in 15 months after the beginning. This bridge has never given any trouble, and no collisions of boats with the piers, of any importance, have ever taken place. Although cast iron was used in the upper chords, as was the fashion of that day, no ill effects have followed. This is probably owing to the excellent floor system which was made in advance of the times, and up to the best modern practice. In the piers and foundations Mr. Clarke was among the first of American engineers to use concrete on a very large scale, which practice he has continued to follow in later works.

Mr. Clarke was the senior partner of the firm of Clarke, Reeves & Co., of Phoenixville, Pa., which later became the Phoenix Bridge Co. The work of this company spread all over the Union, and comprised not only many of the most important bridges that have been built, but a considerable part of the elevated railroads of New York. One of the famous works in which he was especially interested while at Phoenixville was the Kinzau viaduct, which was at the time the highest viaduct in the world, and which was singularly bold in design and rapid and economical in construction. In this work 1,750 tons of iron were distributed and erected in the summer of 1882 in less than four months, and the erecting was done without scaffolding. The greatest height of this structure above the bottom of the gorge is 210 ft.

In 1884 Mr. Clarke became one of the original members of the Union Bridge Company, which speedily came to be one of the foremost bridge building concerns in the world, perhaps the greatest in the magnitude of its operations. While Mr. Clarke was connected with this company it invaded Australia and built the famous Hawkesbury bridge, which was one of the brilliant achievements of American engineering commercially as well as professionally. At the same time the company was building the bridge across the Hudson River at Poughkeepsie, whose foundations are 135 ft. below water, and of this Mr. Clarke had especial charge. In fact, he has been closely concerned in the building of over 80 miles of bridges and viaducts. He is now Consulting Engineer of the great Third Avenue bridge in New York, for the design and construction of which he is entirely responsible, in connection with Mr. G. W. Birdsell, Chief Engineer of the Department of Public Works.

Mr. Clarke has been an unusually industrious writer of engineering monographs. Many of his papers are embodied in the Transactions of the American Society of Civil Engineers, and he has received from the Institution of Civil Engineers (British) the Telford medal and the Telford premium for papers contributed. He has also written considerably for magazines and reviews. He is a member of the American Society of Civil Engineers, of course, also of the American Society of Mechanical Engineers, American Institute of Mining Engineers, the Institution of Civil Engineers (British), and of the American Philosophical Society of Philadelphia—the oldest scientific society in the United States. He is also

a member of the Century Club in New York, and the Union Club in Boston.

Mr. Clarke shares with the late C. Shaler Smith the credit of the invention of the modern metallic railroad viaduct with braced towers and connecting spans. He is now engaged in developing the largest irrigation scheme ever attempted in this country.

Grab-irons.

At the December meeting of the New England Railroad Club a discussion on grab-irons or handholds was opened by Mr. John T. Chamberlain, Master Car Builder of the Boston & Maine. He says that the railroads throughout the country are progressing, but he has still to deal with a great many cars that are not equipped according to law. At Northampton, for instance, he is applying grabirons to about 50 cars a day, one-half of which belong to his own road and one-half to the New York, New Haven & Hartford. His opinion is that the railroad companies are working in the dark as to what is strict conformity with the law. On platform cars he is putting a grab-iron over the step, but why he does not know, except that it is the law.

Mr. Marden said there was no doubt that a uniform position for grab-irons is desirable, but what the best location is he is not prepared to say. As to platform cars, he has issued a blue-print authorizing grab-irons

raw material, the use of cars in transporting material which could otherwise be used in earning money for the company, and general expenses or interest. In his opinion it is not good policy for a railroad company to make what it can buy outside. Labor so employed is taken from the general work of repairs which is necessary for the successful operation of the road. The Erie is gradually getting to buy its locomotive frames because the manufacturers can make a frame cheaper than the railroad companies can. The railroads, however, must manufacture certain things that will use up scrap, for instance, bolts. They must also manufacture the lumber which is put in car repairs. About five years ago the Erie Railroad shut up its foundries, preferring to buy cast iron outside. They can buy their castings as cheap as they can make them. Brasses they buy entirely.

Mr. Higgins (Lehigh Valley) said that there is one controlling fact—namely, that the shop capacity has not increased in the last 10 years in proportion to the increase in equipment and in business. The company now frequently finds it necessary to go outside to buy parts that formerly were made in its own shops simply for want of capacity. This he believes will gradually force the railroad companies out of manufacture.

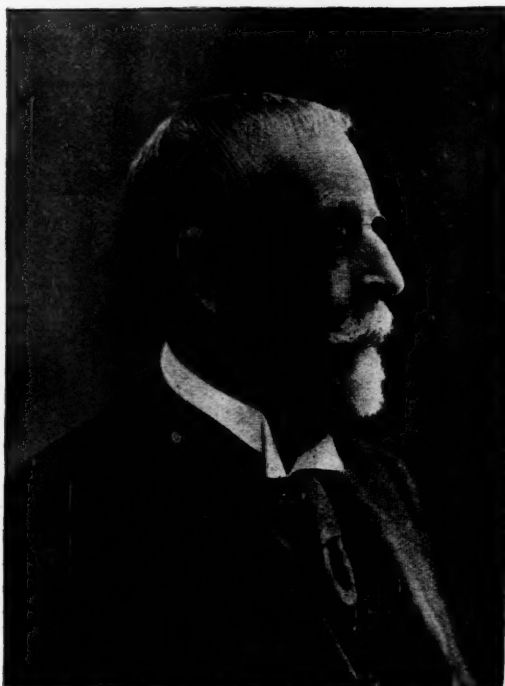
Mr. West (O. & W.), President of the Club, says that the Ontario & Western finds that in many cases it can buy a manufactured article now cheaper than it could formerly buy the raw material, as, for instance, brasses; that company buys not only brasses, but iron castings, bolts, nuts and forgings. It does, however, utilize old bolts to make shorter lengths and short bolts are at present not often purchased. Mr. Coleman (General Storekeeper, Lehigh Valley) says in general it would be preferable to buy material outside; still there are special cases in which it pays to manufacture. The Lehigh Valley is able to make about 45 per cent. of its car bolts from old bolts and rods. It costs now about 0.15 of a cent per pound, to handle scrap rods and scrap bolts from the car at the scrap platform to the shops. The average cost for bolts made out of scrap is far less than that of bolts purchased. His road finds it economical to buy brass castings, bearings and engine castings. It has not been found economical to buy gray iron castings. These it is making cheaper than any manufacturer has yet proposed to furnish. A great many small articles can be bought of the manufacturers from 10 to 40 per cent. cheaper than the road has ever been able to make them. This road buys all nuts tapped, this being cheaper than to change the taps for various sizes.

Mr. H. H. Vreeland (President Metropolitan Traction Co.) had made a very careful investigation of this subject as applied to electric railroads. He found that it was a pretty common experience that such companies had begun the manufacture of various parts in order to force down prices. For instance, one company had paid five years ago \$3.50 for a trolley wheel; now they turn it out themselves for 75 cents, and have brought the manufacturers' price down to 65. Motor equipment for a car four years ago cost \$2,500. Recently he has placed an order for the same thing for \$675. But competition and specialization have gone so far that "there is not a single maintenance part of equipment manufactured by us," Mr. Parke (Westinghouse Air Brake Co.) spoke generally of the fact that as a matter of principle the manufacturers are able to produce material cheaper than the railroads. For instance, Messrs. Jackson & Woodin are to-day offering to sell to railroads the M. C. B. brake gear complete for a price about one-third of the lowest estimate that he (Mr. Parke) has ever seen handed in by master car builders to their superior officers.

Mr. Mitchell spoke further, illustrating by some details his previous remarks. He said railroad companies are giving up manufacturing because their shop tools are becoming antiquated. Where an old frame slotter would only slot one pair of frames the Baldwin Locomotive Works have a slotter that will slot four pairs at once. A Daniels planer in a railroad car shop planer one side of a timber at 4 ft. a minute. The modern planer will plane four sides at 60 ft. a minute. Railroads cannot afford to put in new tools every 10 years in order to keep up with the times.

Mr. Wattson (West Shore) argued that it pays railroad companies to do a certain amount of manufacturing in order to keep a permanent force of good men in the shops during dull times.

To this Mr. Higgins replied that when dull times come, with reductions of expenses, the first place to suffer is the shop.



Thomas C. Clarke.

PRESIDENT AM. SOC. C. E.

to be put on the under side of the sill. It is his observation that a great many cars have been equipped since the law went into effect. He would like to hear an expression of opinion as to whether it is better to put grab-irons under the end sill or on the side of it. He is of the opinion that under the sill it is practically useless.

Mr. Robertson thought that in this case it would be better to put it near the top of the end sill. He finds very few cars running over his road that are not well equipped, and at inspection points they are equipping cars as fast as possible.

Mr. Adams does not believe that there is any need of handholds on flat cars. Underneath the sill it would be practically useless and anywhere else it would be objectionable.

Should Railroads Buy or Manufacture?

At the November meeting of the New York Railroad Club a topical discussion was introduced as to "whether it is good policy for a railroad to manufacture to any considerable extent articles for repairs that can be purchased in the open market."

In discussing this Mr. Mitchell (Erie) said that in estimating the cost of their own manufactures railroad companies often neglect to charge in the freight on the

Pneumatic Interlocking at Nashville.

Mr. J. W. Thomas, Jr., Assistant General Manager of the Nashville, Chattanooga & St. Louis, has devised a complete pneumatic interlocking machine for switches and signals, which is worked without the aid of electricity, and has put it in use on his road at Nashville. In the following paragraphs and the accompanying engravings the apparatus is described. The fundamental feature of this design is the manipulation of the valves admitting air to and exhausting it from the working cylinders of the signals and switches, by means of pistons of the equalizing type, the pistons being actuated by compressed air. The experimental plant, consisting of eight levers, operating two switches, one cross over and seven signals has been in operation for the past twelve months, giving satisfactory results.

Switches.—Fig. 1 is an axial section of valves for admitting air to and exhausting it from the working cylinders of a switch, and also shows section of reservoirs 6 and 6'. Fig. 2, is cross-section. Fig. 3 is a top view of reservoirs and valve seats; and Fig. 4 is an axial view of the working cylinder and a top view of chests and reservoirs.

When the switch is in its normal position, pressure in controlling pipe 4, chest 5 and reservoir 6, is at 70 lbs. per square inch, the pressure in chest 5 and reservoir 6 having equalized with the pressure in controlling pipe 4 by means of equalizing port 7; chest 5 and reservoir 6 are in communication by means of passages 3, Fig. 3. The pressure in controlling pipe 4, chest 5, and reservoir 6' is at 80 lbs. Under these conditions, piston 8 is to the right, and F end of cylinder 1, Fig. 4, is in communication with the atmosphere by way of port 9, slide valve 10, and exhaust port 11. Piston 8' is also to the right, and B end of cylinder 1 is in communication with main supply 12, by way of slide valve 10' and port 9'. In order to reverse the switch, pressure in controlling pipe 4 must be increased, and as the increase takes place more rapidly than air can flow through equalizing port 7, piston 8 is moved to the left, taking slide valve 10 with it, thereby admitting air at 80 lbs. pressure from main supply 12 to F end of cylinder 1; at the same time pressure in controlling pipe 4' must be reduced, and as the reduction takes place more quickly than air can pass through the equalizing port piston 8' is moved to the left, valve 10' is carried with it, and air is exhausted from B end of cylinder 1 and switch goes over. Reservoirs 6 and 6' are added to increase the capacity of chests 5 and 5' respectively. The minimum pressure in controlling pipes is 70 lbs., the maximum pressure 80 lbs.

To the frame of the interlocking table in the tower is attached a switch controlling valve 13, a view of which is shown at Fig. 5. Port 4 is connected to controlling pipe 4, and port 4' to controlling pipe 4' of Fig. 1. Ports 15 and 16 are each connected to a cast-iron reducing reservoir located at some suitable point in the tower; port 17 is the exhaust. With operating lever 18 in its normal position, slide valve 14 takes the position as shown in drawing, and air from main supply 19 flows into controlling pipe 4'. Controlling pipe 4 is in communication with reducing reservoir 15; reservoir 16 is in communication with the atmosphere by way of exhaust port 17. When it is desired to reverse the switch, valve 14 is moved upward, thereby closing communication between body of chest and controlling pipe 4', and establishing communication between controlling pipe 4' and reducing reservoir 16, and as all of the air has been exhausted out of reservoir 16, air from controlling pipe 4' flows into this reservoir, thus reducing the pressure in controlling pipe 4'; at the same time valve 14 uncovers port 4, and pressure in controlling pipe 4 is increased to 80 lbs.; reservoir 15 is also put in communication with the atmosphere. The reservoirs should be of such size as to reduce the pressure in the controlling pipes about 10 lbs. when communication is established with them.

In order to accomplish the interlocking it must be so arranged that lever 18 and its tappet 19 must make but one half of their stroke unless the switch has properly responded, therefore slide valve 14 must be shifted its full throw during the first half of the stroke of lever 18, said lever to have a silent movement in passing from its C to its E position, at least so far as slide valve 14 is concerned. To the upper end of valve stem 13 is secured piece 20. When it is desired to reverse the switch, latch lever 18 is brought up against lever 18, thus raising latch 21 out of notch in quadrant and putting latch 22 in engagement with lower part of projection on 20. After valve 14 has traveled its full throw, it strikes against stop in chest, thus preventing lever 18 from going further than its C position; latch lever 18 is then released and latch 22 is disengaged from 20, after which lever may be taken to its E position, if switch responds properly. When it is desired to put the switch back to its normal position latch 22 is brought into engagement with top of

projection on 20; valve 14 is shifted to its normal position, thus reducing pressure in controlling pipe 4, and increasing pressure in controlling pipe 4'. Valve 14 is moved its full throw by the time lever 18 reaches its C position. Latch 18 is now released and lever may be brought to its D or normal position, provided switch has properly responded.

Switch Indication.—As it is of the utmost importance that there be no question as to whether a switch responds properly or not, two indication pipes are used, it being impossible to get the proper indication with one pipe, for at one move or the other the indication would have to be gotten by a reduction of pressure, and as this reduction might be the result of a leak, a false indication would be given. With two indication pipes, in one of which the pressure must be reduced and in the other increased in order to give the indication and release the lever, a false indication cannot be given. At Figs. 6 and 7 is shown the apparatus at the switch for giving indications. The switch and lock movement has 8 in. stroke, whereas the switch points have only 4 in., therefore bar

forcing its piston upward. Indication pipe 31', valve 35 and reservoir 35' contain air at 70 lbs. pressure, and slide valve 36' has exhausted air from upper end of cylinder 39. Rod 41 is so connected to piston rod 40, that when 40 moves downward, 41 moves upward, and vice versa.

Fig. 8 shows relative position of tappet and locking pins with tappet, lever and switch in their normal position. Fig. 9 shows relative position of tappet and locking pins with lever and tappet in their C position, should switch fail to respond. Fig. 10 shows relative position of tappet and locking pins in their C position, if switch responds properly and lever free to be moved to its E position. Fig. 10a shows relative position of tappet and locking pins with tappet, lever and switch in their reversed position. It will be noted that pin 41 is ready to stop tappet at half-stroke should switch fail to respond when lever is brought from its E to its C position.

Should lever 18 be brought from its D to its C position and switch fail to respond, it would be impossible to complete the stroke of the lever or its tappet 19, as edge 42' of slot 42, Figs. 8, 9, 10 and 10a, would be brought up against piston rod or pin 40. If switch responded properly, arm 25, Fig. 7, would strike knocker 27', valve 29, Fig. 6, would be forced to the left, indication pipe 31 would be put in communication with reducing reservoir 32, and pressure reduced to 70 lbs.; indication pipe 31' would be put in communication with body of chest 28, pressure would be increased to 80 lbs. and air would be exhausted out of reservoir 32' through exhaust port 33. A reduction of pressure in pipe 31 would cause piston of valve 34 to move downward and slide valve 36 would exhaust air from bottom end of cylinder 39, an increase of pressure in indication pipe 31' would move piston of valve 35 upward, and slide valve 36' would admit air into upper end of cylinder 39, thus lowering pin 40, Figs. 5, 8 and 9, out of engagement with notch 42 and raise pin 41 into notch 43 on opposite side of tappet 19 (see Figs. 10 and 10a). The lever can now be put in its reversed or E position. With locking pins in position shown at Fig. 10a, pin 41 is ready to stop tappet at half-stroke should switch fail to respond when lever is brought from its E to its C position.

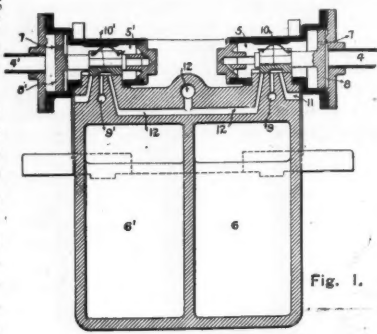


Fig. 1.

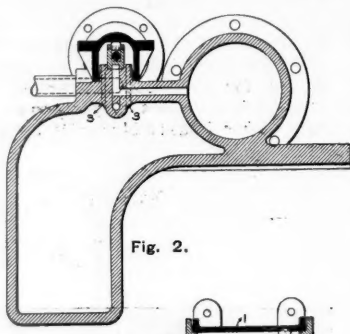


Fig. 2.

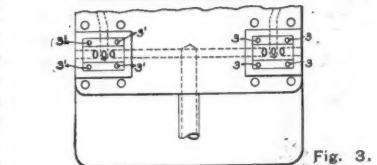


Fig. 3.

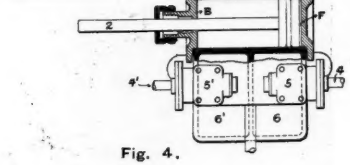


Fig. 4.

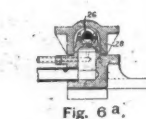


Fig. 6a.

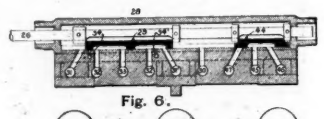


Fig. 6.

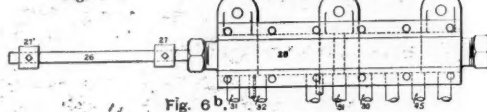


Fig. 6b.

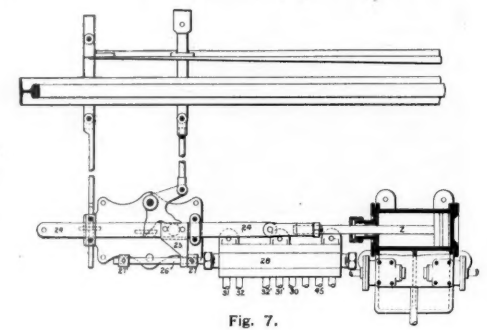


Fig. 7.

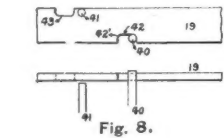


Fig. 8.

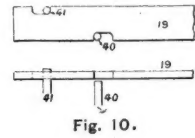


Fig. 10.

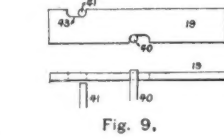


Fig. 9.

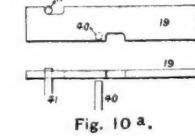


Fig. 10a.

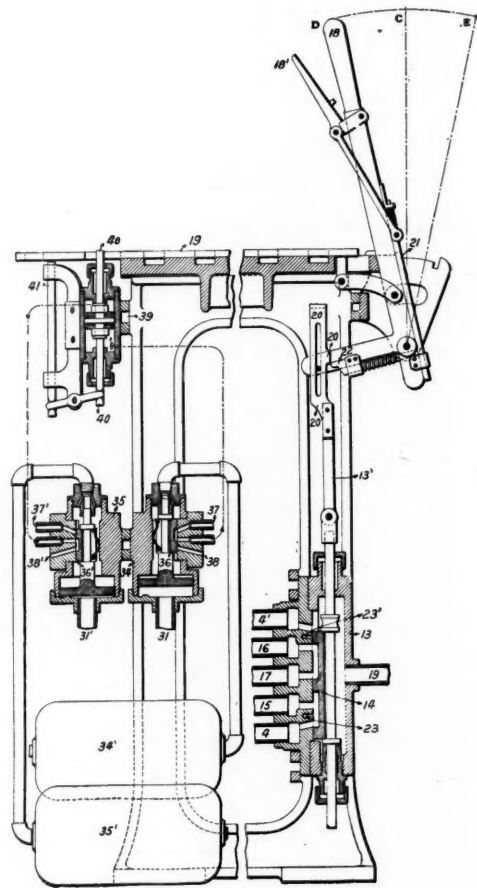


Fig. 5.

Pneumatic Interlocking Apparatus for Switches and Signals.

24, Fig. 7, moves 2 in. before the points begin to move and 2 in. after the points are up. To bar 24, which is coupled direct to the piston rod is bolted arm 25. Through the outer end of this arm passes valve stem 26, the stem being provided with adjustable knockers 27 and 27'. With switch in its normal position, slide valve 29, Fig. 6, takes the position shown; chest 28 is supplied with air at 80 lbs. pressure through connection 30, and as indication pipe 31, leading from switch to tower, is in communication with body of chest, it contains air at 80 lbs. pressure. Indication pipe 31' being in communication with reducing reservoir 32', contains air at 70 lbs. Port 33 is exhaust. Attached to the locking table in the tower (See Fig. 5) are two valves 34 and 35, and tappet locking device 39. With switch in its normal position, indication pipe 31, valve 34 and reservoir 34' contain air at 80 lbs. pressure, and slide valve 36 has established communication between main supply and lower end of cylinder 39,

In the levers of the machine, the beveled type of locking is used; hence, if lever cannot be fully reversed, it locks all levers with which it is interlocked.

Reservoirs 34' and 35' are used to increase capacity of valves 34 and 35, respectively.

Two Position Signals.—Fig. 11 is the general arrangement of parts on the mast; Fig. 12 is the indication chest Fig. 13 is a vertical section of signal valve and cylinder and Fig. 14 is a cross-section of signal valve, cylinder and reservoir. Fig. 15 is a top view of the valve seat.

With signal in its normal position, controlling pipe chest 2, and reservoir 3 (see Fig. 13), contain air at 70 lbs pressure, the equalization between controlling pipe and chest having taken place by means of equalizing port 5 and the equalization between chest 2 and reservoir having taken place through ports 6, Fig. 15; piston 7 and slide valve 8 are to the left, air is exhausted out of ope

ating cylinder 9, and counterweight 10, Fig. 11, has brought blade to its horizontal or danger position. To put signal to safety, pressure must be increased in controlling pipe 1, and as the increase takes place more rapidly on the controlling pipe side of piston 7 than it does on the opposite side of the piston, piston is forced to the right, carrying with it slide valve 8; exhaust port 11 is closed; air from main supply 12 is admitted by way of port 13 to operating cylinder 9, and the blade is brought to its vertical or safety position. Reservoir 3 is added to increase capacity of chest 2.

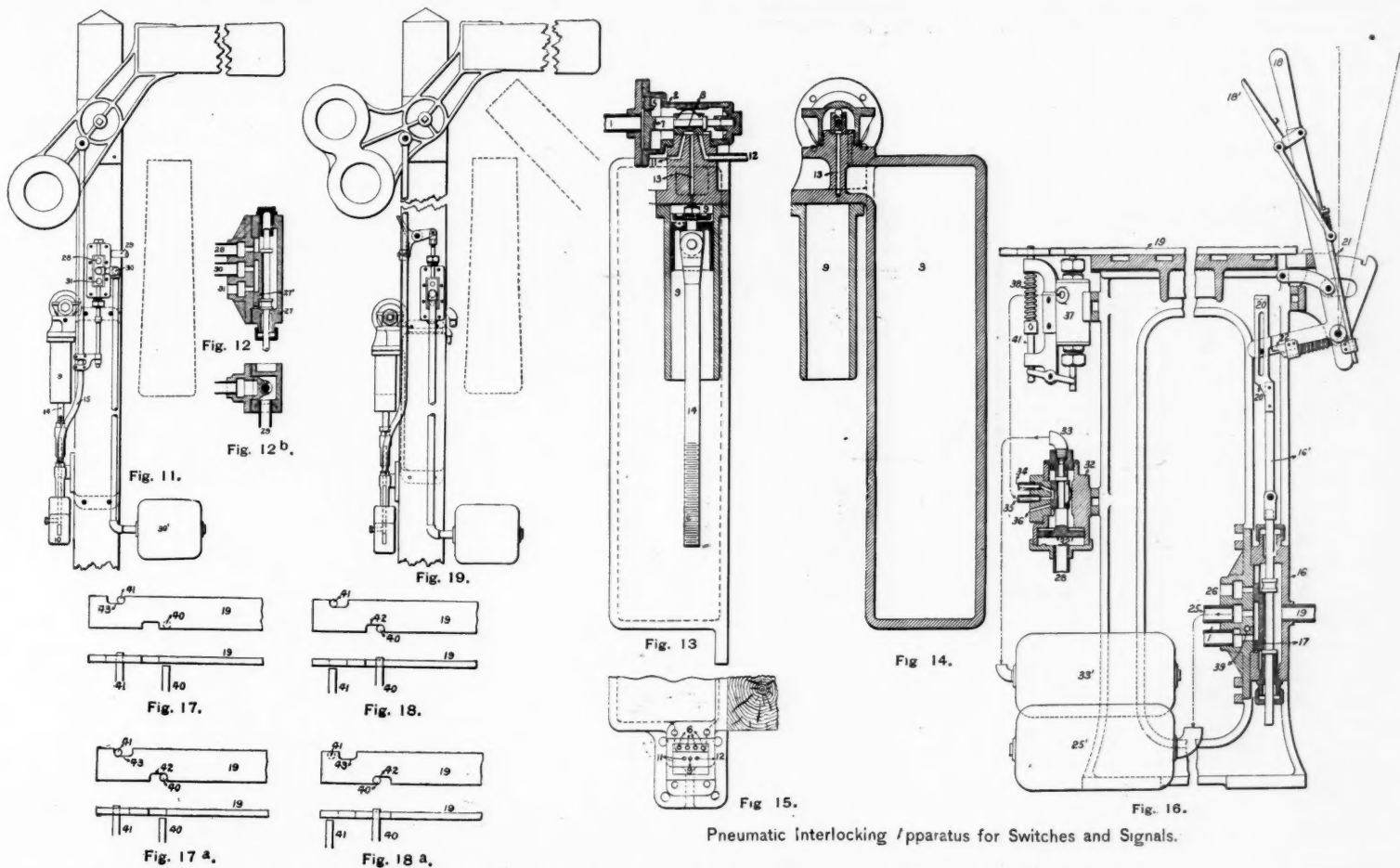
Signal controlling valve 16 (see Fig. 16) is bolted to the frame of the locking table; 1 is controlling pipe leading from tower to signal; 25 is port leading to reducing reservoir 25'; 26 is exhaust. With valve 17 in the position shown, controlling pipe 1 is in communication with reducing reservoir 25', and pressure in controlling pipe is at 70 lbs. To put signal to safety, valve 17 is brought to its highest position and air at 80 lbs. pressure flows from body of signal controlling valve 16 into the controlling pipe, thus increasing the pressure; and, as heretofore explained, the signal goes to safety. To restore the signal to danger it is only necessary to put valve 17 in the position shown at Fig. 16, thereby establishing communication between controlling pipe 1 and reducing reservoir 25', air flowing into this reservoir reducing the pressure in controlling pipe, piston 7, Fig. 13, is shifted to the left, carrying its slide valve with it, thus exhausting the air out of working cylinder, and the counterweight takes the signal to danger.

Signal Indication.—Assuming that it is more important to know that a signal resumes its danger position

reservoir 23' also contain air at 80 lbs. pressure. Under these conditions piston 32' of valve 32 is in its highest position, and air from main supply 34 is admitted into upper end of cylinder 37, forcing locking pin 40 down and locking pin 41 up. When lever 18 is brought to its *C* position, valve 17 has moved its full stroke, said valve is then dropped, and if signal responds properly slide valve 27', Fig. 12, reduces the pressure in indication pipe 28 by establishing communication between said indication pipe and reducing reservoir 30', Fig. 11; piston 32' of valve 32, Fig. 16, is actuated, air is exhausted out of upper end of cylinder 37, and spring 38 forces locking pin 41 down out of engagement with slot 43, and locking pin 40 up and into engagement with slot 42 (see Fig. 18), and the lever and its tappet are now free to move to the *E* position. Should the signal fail to respond properly, pressure in indication pipe 28 would not be reduced, air would not be exhausted out of cylinder 37, locking pin 41 would not be withdrawn from slot 43, and lever 18 could not be moved beyond its *C* position (see Fig. 17a). If after lever is brought from its *E* to its *C* position, the signal should fail to go to danger, valve 27', Fig. 12, would not be shifted, pressure in indication pipe 28 would not be increased, equalizing piston 32' of valve 32 would not be actuated, upper end of cylinder 37 would not be charged with air, pin 40 would not be withdrawn from slot 42, Fig. 18, and lever 18 and its tappet could not be moved beyond its *C* position, and all conflicting levers would remain locked.

Three Position Signal.—Fig. 19 is general arrangement of parts on mast; Fig. 20 is a side view of three-position signal valve, reservoir and cylinders; 21 is cross-

In Fig. 22 is shown controlling valve 17 for reducing and increasing pressure in the controlling pipe of a three-position signal. The body of the chest 17 contains air at 65 lbs. pressure, the pressure having been reduced from 80 to 65 lbs. by means of pressure reducing valve connected at 19. Controlling pipe 1 is in communication with port 24', said port leading to reducing reservoir 24'. Pressure in controlling pipe 1 is therefore reduced and signal is at danger. To put signal to caution, latch lever 18' is brought up against lever 18, latch 21 is disengaged from quadrant and latch 22 enters notch 23 of part 20, and the lever with its tappet 19 is brought to its *C* position, slide valve 16 of controlling valve 17 is brought to its middle position. In this position port 16' of slide valve 16 is opposite port 1, communication is established between body of chest and controlling pipe 1, pressure is increased to 65 lbs., and signal goes to caution. At the same time communication is established between port 24 and exhaust port 25, thus exhausting air out of reducing reservoir 24'. If signal responds properly and it is desired to give a caution signal, latch lever is released, thereby dropping slide valve 16 in its middle position and lever 18 can be put in its reverse position in order that the proper interlocking may be accomplished. If it is desired to give a safety signal, latch lever 18' is not released when lever is brought to its *C* position; but, as soon as the indication is received showing that the signal has left its danger position, the lever and its tappet, and slide valve 16, can be put in their reverse position; port 1 is blanked and air at 80 lbs. pressure passes from port 26 into controlling pipe 1 by way of port 27 and branch pipe 1', and the signal will



Pneumatic Interlocking Apparatus for Switches and Signals.

than it is to know that it goes to safety, the indication for signals has been arranged so that an increase of pressure must take place in the indication pipe before the lever operating the signal can be brought near enough to its normal position to unlock conflicting levers.

Valve 27, Fig. 12, controls the pressure in the indication pipe 28 leading to the tower; 29 is main supply; 31 is exhaust; 30 is port leading to reducing reservoir 30' located at the foot of mast. With signal in its normal position, indication pipe 28 is in communication with main supply, hence contains air at maximum pressure. Pipe 28 is connected with indication valve 32 in tower (see Fig. 16); 33 is connection to reservoir for increasing the capacity of chest 32; 34 is main supply; 35 leads to upper end of cylinder 37; 36 is exhaust.

Fig. 17 shows the relative position of the tappet and locking pins with tappet, lever and signal in their normal position. Fig. 17a shows relative position of tappet and locking pins with lever and tappet in their *C* position should signal fail to go from danger to safety. Fig. 18 shows relative position of tappet and locking pins with tappet and lever in their *C* position and free to be moved to their *E* position, signal having gone from danger to safety.

Fig. 18a shows relative position of tappet and locking pins with lever and tappet in their reversed position, and signal at safety. It will be noted that pin 40 is ready to stop lever at its *C* position, as it is being moved from *E* towards *D*, if signal does not go to danger.

As heretofore stated, indication pipe 28 contains air at 80 lbs. pressure when signal is at danger; chest 32 and

section of three-position signal valve, reservoir and cylinders, and 21a shows the valve seat of a three-position signal valve.

With signal in its normal or danger position, air in controlling pipe 1, chest 2 and reservoir 3 have equalized to say 55 lbs. When an increase of pressure of from 2 to 4 lbs. takes place in the controlling pipe, piston 7 is shifted to the right taking with it slide valve 8; air from main supply 12 is admitted to cylinder 9' and signal is brought to its caution position, the piston of cylinder 9' having been stopped by projection in bottom end of cylinder. Piston rod 7' strikes stem 16, which is reinforced by spring 17. Valve 8' is not moved, because the distance between collars 18 and 18' is as much greater than the length of valve 8' as the travel of valve 8 during its first move. Now, if pressure in controlling pipe 1 is still further increased, piston 7 will be shifted further to the right, spring 17 will be compressed, valve 8' will be shifted and air from main supply 12' will be admitted to cylinder 9, the safety cylinder. As the pressure on both sides of piston 7 approaches equality, the piston will be shifted to its middle position on account of the pressure of spring 17 against piston rod 7', but valve 8' will remain stationary. To put signal to danger, it is only necessary to make a sudden reduction of pressure in controlling pipe 1. It will be noted that piston rod 14' is extended downward and into engagement with piston rod 14. When cylinder 9' is charged with air the balance lever is actuated by lower end of piston rod 14' striking against stop 19 of piston rod 14. When cylinder 9 is charged with air, piston rod moves freely through the projection on rod 14' and blade is moved to safety.

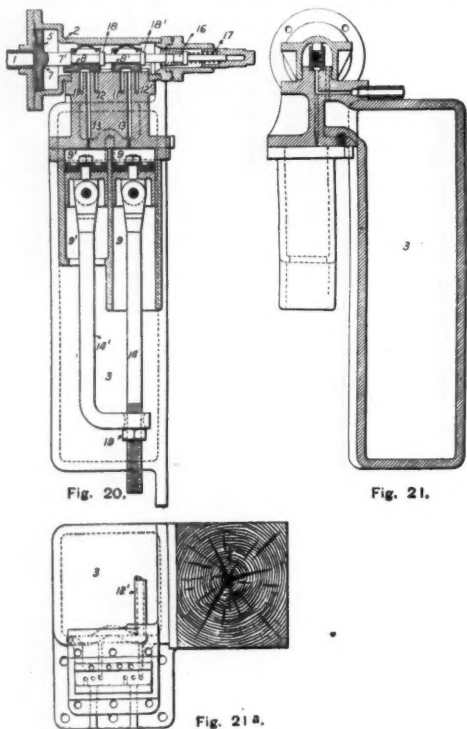
be brought to safety as heretofore explained. To restore signal to danger it is only necessary to put valve 16 in the position shown in Fig. 22. The indication for three-position signals is the same as that for two position-signals, in that the levers and the tappets cannot be brought near enough to either their normal or reversed positions to unlock conflicting tappets unless the signals respond properly.

Pneumatic Selector.—Where there are two blades on a mast, to give indications for two diverging routes, each of the blades will have its own independent equalizing piston and appliances connected therewith, such as represented in Fig. 11. In other words the apparatus shown in Fig. 11 will be duplicated. Instead, however, of the controlling pipe 1, Figs. 13 and 16, leading direct from the signal controlling valve in the tower to the equalizing cylinder (or either of them on the mast) it leads from the signal controlling valve in tower to port 45, Figs. 6 and 7. Port 46 leads to equalizing or signal valve operating top blade; port 47 leads to signal valve operating bottom blade. With slide valve 44 in the position shown, if signal lever is pulled an increase of pressure will take place in controlling pipes 45 and 46 and top blade will be actuated. If switch is in its reversed position, arm 25, Fig. 7, will have shifted valve 44, Fig. 6, to the left, establishing communication between controlling pipes 45 and 47. Now if the same lever is pulled the increase of pressure will take place in controlling pipes 45 and 47, and as 47 leads to signal valve operating the lower blade, the lower blade will be brought to safety. A pneumatic selector is thus provided whereby one lever can handle two or more signals,

the signal handled depending entirely upon the position of the switches.

Locking Dogs.—We have seen that the switches and signals must respond properly before levers operating them can be fully reversed. It is obvious that a lever can be brought from its *D* to its *C* position, which as heretofore explained should operate the switch or signal, and that while the switch or signal is moving the lever can be returned to its *E* or *D* position. Let us take a single lever for example: When lever is brought from its *D* to its *C* position, the signal should go to safety. Now, while the increase of pressure is taking place in the controlling pipe, the signal is moving from danger to safety, and the decrease of pressure is taken place in indication pipe; there is nothing to prevent lever being returned to its *D* position, the locking pin striking the bottom of the tappet. We should then have the signal lever and its tappet in their normal or danger position, and the signal at safety. To obviate this we must so arrange that after a lever has been started from its normal or reversed position, it cannot be returned to either of these positions again until it has made a full stroke backward or forward as the case may be. To this end the pawl and ratchet arrangement shown in Fig. 24 is used.

K-L is a slot in side of quadrant *M*; *I* is a pin passing through and secured to lever; pawl *N* is pivoted to outer end of pin *I*, and engages with ratchet *Q*. The lower end of pawl *N* is pivoted to rod *P*; rod *P* has spring *P'*. Rod *P* engages with eye bolt, the bolt being fastened to quadrant. As lever is being carried from its *D* to its *C* position, that part of pawl marked *N'* engages with teeth in ratchet *Q*. If, after the lever is started from its normal position any effort is made to return it to its normal position before it is carried to its *E* or reversed position, *N'* engages with the teeth and prevents the movement. When lever reaches about $\frac{3}{4}$ stroke, pawl *N* strikes pin *R*, the position of pawl is reversed, and that part of pawl marked *N'* engages with the teeth in the ratchet, and will prevent lever after having been once moved from its *E* or reversed position, being returned to that position until it has moved to its *D* position.



fall to 50 lbs. before the switches and two-position signal would fail to respond. The three-position signal refused to leave its danger position when pressure had fallen to 60 lbs. All signals can be put to danger, even if pressure should fall as low as 4 lbs. A $\frac{1}{4}$ -in. cock may be left wide open on the controlling or indication pipe of a signal 1,000 ft. away, and even with this leak the signal and its indication will respond promptly.

Three-quarter-inch wrought pipe is used for controlling and indication pipes. Most of the pipes in the experimental plant are above ground. Reservoirs are made of cast iron. With the thermometer at 10 degs. below zero F. no trouble whatever was experienced with ice closing up the ports or passages, or causing the equalizing pistons to stick. A careful search was made, but not the slightest particle of ice could be found in any of the valves, ports or passages. With the yard flooded with water to the tops of the ties the switches and signals responded without interruption.

Safety.—The pressure must be increased or decreased suddenly, otherwise the equalizing pistons will not be actuated. A reduction or increase of pressure caused by a leaky slide valve will not actuate these pistons. To demonstrate this, slide valves were made to leak very badly, the leak being very much greater than if a valve were permitted to run for years without attention. In each instance the increase or reduction of pressure caused by such leaks failed to actuate the equalizing pistons.

Should the high pressure controlling pipe of a switch, or a switch indication, spring a leak, and the pumps or compressors be unable to maintain the pressure against such leak, the switch will not fly over nor will a false indication be given, for in order to get the switch over or to get an indication, a sudden increase of pressure

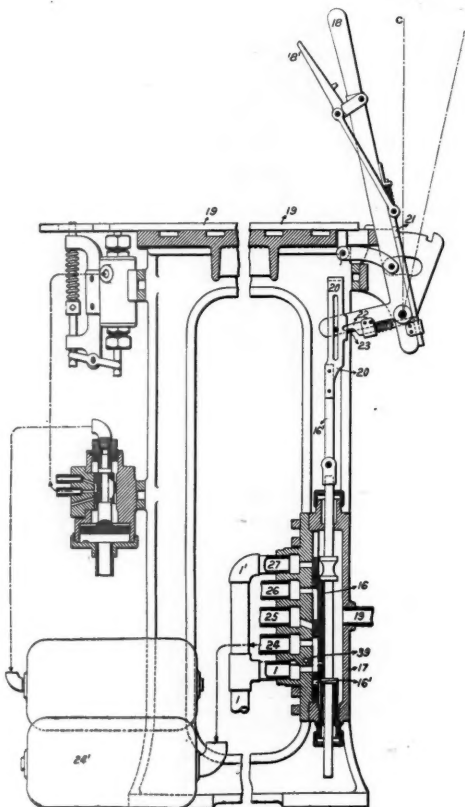


Fig. 22.

Pneumatic Interlocking Apparatus for Switches and Signals.

Cost of Steel Rails in 1874 and 1875.*

When first made in this country their cost to railroads [steel rails] was about \$130 per ton; to-day the market price is from \$28 to \$29 per ton. What they cost the manufacturer now I am not at liberty to say, even supposing I have that knowledge; but I can give some ancient cost sheets, which may possess some interest.

In 1874 and 1875 there were produced in this country 144,944 and 290,863 net tons of steel rails. At one of the then most prominent Western works the cost for the two years was summarized as follows, not including salaries, insurance or taxes:

Cost of Steel Rails in 1874 and 1875.

Converting:		
85 per cent. work / own coke pig, at.....	\$33.00	\$33.30
15 " charcoal pig, at.....	35.00	4.2
240 lbs. scrap, at.....	40.00	4.31
199 " spiegel, at.....	51.00	4.57
Repairs.....		1.22
Ingots.....		.90
Labor.....		3.50
Royalty.....		.78
Miscellaneous.....		.50
Ingots.....		\$53.40
Bloom and rail rolling:		
14 tons ingots, at.....	\$33.40	\$66.75
Fuel, steam, at.....	4.50	1.08
Fuel, heating at.....	5.50	2.05
Labor.....		7.65
Miscellaneous.....		1.51
		\$79.04
	Cr.	
400 lbs. scrap, at.....	\$10.00	\$6.80
90 " second-class rails, at.....	73.00	2.93
Cost 1 ton rails.....		\$9.73
Another prominent Western works gave cost for the month of October, 1874:		
Ingots:		
Pig, at \$34 per ton, ingots.....	\$39.15	
Other items, deducting scrap.....	8.66	
Ingots.....		\$47.81
Blooms:		
Ingots.....		\$17.61
Other expenses, less scrap.....	5.90	
Blooms.....		\$23.51
Rails:		
Blooms.....		\$53.71
Other items, deducting scrap.....	13.56	
Rails.....		\$67.27
A prominent Eastern mill's cost in January, 1875, gave:		
Average cost pig and spiegel.....	\$33.53	
Average cost same into ingots.....	15.37	
Average cost ingots into blooms.....	9.67	
Average cost blooms into rails.....	9.28	
1 ton rails cost.....		\$68.25

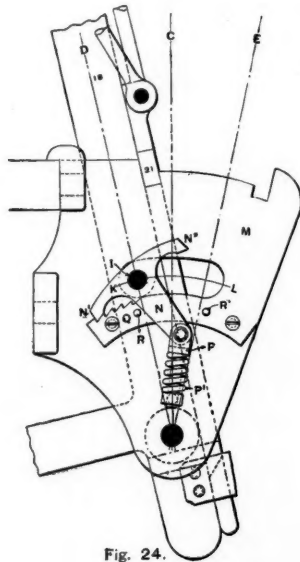


Fig. 24.

Leakage.—As it is almost impossible to keep the pipe lines perfectly tight, feed ports have been introduced whereby the low pressure pipes are supplied with air at minimum pressure, that is 70 lbs. As signals are kept at danger except when they are lowered to permit a train to pass, and as when signals are at danger the indication pipes are in direct communication with the main supply, and as the indication pipes are only cut off from the main supply when the signals are at caution or safety, it has not been found necessary to provide against leakage in them. (See ports 23 and 23', Fig. 5; 34 and 34', Fig. 6; 30, Figs. 16 and 22; 11, Fig. 25) Without some method of providing against leakage the switch or signal could be pulled over the first time just as quickly as though the pipes contained normal pressure, but we should have to wait until the pressure behind the equalizing pistons reached something over 70 lbs. before the switch or signal could be moved again.

Simplicity.—As will be seen from the foregoing explanation, there is no complicated or delicate mechanism to get out of order. Springs perform no important functions, except in the valves of the three-position signal. If thought advisable, the springs on the locking pins can be discarded and weighted levers substituted; but as they can be easily inspected, and can be made amply strong, no fears are entertained as to their doing the work satisfactorily. The absence of electric and hydraulic apparatus contributes largely to the simplicity of the system.

The apparatus needs no delicate adjustment; the pumps have been stopped and the pressure allowed to

must be had in the low pressure pipe. Should the controlling pipe of a signal spring a leak, and the pumps or compressors be unable to maintain pressure against such leak, the signal will go to danger. It will be remembered that it is necessary to increase the pressure in the signal indication pipe to get tappet unlocked so as to put lever in its normal position.

Speed.—A switch 100 ft. away has been operated, and the indication given, in 0.8 second; one 250 ft. away in 1.05 sec.; one at 500 ft. away in 1.75 sec.; one at 750 ft. away in 2.5 sec.; and one at 1,000 ft. away in 3.1 sec. A signal 100 ft. away has been operated in 1.25 seconds; 300 ft. away in 1.1 sec.; 350 ft. away in 1.34 sec.; 500 ft. away in 1.91 sec.; 1,000 ft. away in 3.1 sec.; 1,500 ft. away in 4.00 sec.; and 2,000 ft. away in 5.5 sec. It is not necessary to wait for pressure to equalize. By actual test, a switch was handled as follows: 250 ft. away 20 times a minute; 500 ft. away 20 times a minute; a signal, 300 ft. away, 28 times, and one 1,000 ft. away the same.

Home and distant signals can be handled with the same lever, the indication being so arranged that the lever cannot be fully reversed unless both signals go to safety, and that the lever cannot be put near enough toward its normal position to unlock conflicting levers unless both signals go to danger. A pneumatic "slot" is provided by running a controlling pipe from one machine to the controlling valve of a second machine. Both levers must be reversed in order to pull off the signal. If either one of the levers is brought from its reversed to its *C* position the signal is restored to danger.

Early in 1873, with Bessemer pig iron at about \$65, it was a serious question at another works, situated in the middle of the country, if they were keeping even with rails from \$120 to \$125 per ton.

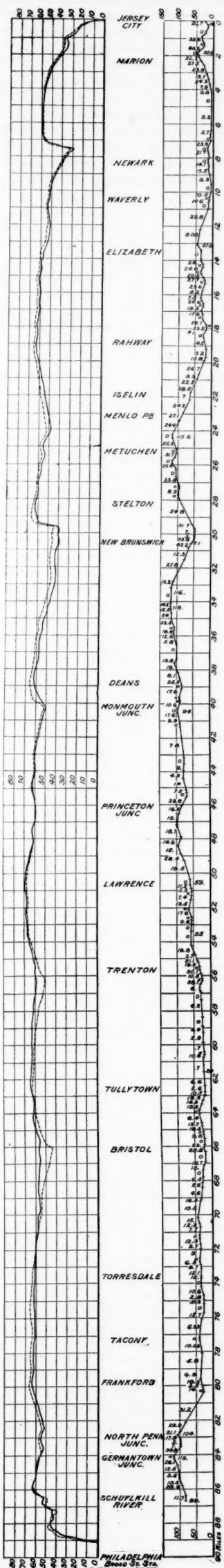
In comparing the statistics given above with the present, the relative cost of pig and fuel must not be overlooked. If Western producers could now realize from \$33 to \$35 a ton for their pig iron and the coal \$4.50 and \$5.50 per ton for their coal, it is probable that the business sky would appear to them much brighter.

It has been and is constantly stated by various railroad officials that American rails are not as good as those made abroad. I think they are mistaken, and base their opinion on deductions drawn from entirely different conditions. I have called attention to the great change which has occurred in weight of rolling stock, speed and number of trains, etc. The foreign rails were not at first subjected to the same conditions which American rails have now to meet. I am firmly convinced that if the first duty to which a steel rail is subjected is comparatively light, it will subsequently better resist harder service than if it is at once taxed to the limit of its powers. Again, the early rails, both foreign and American, were of lighter sections, and hence the steel was better worked, which it is impossible to do with the present heavy rails.

Two Fast Runs on the Pennsylvania.

In our issue of Dec. 13, page 820, we gave some of the particulars of two runs made from Jersey City to Philadelphia by a Class "L" engine, No. 1651 of the Pennsylvania Railroad, hauling heavy trains, and on Dec. 27, page 852, we gave drawings showing the general arrangement of this locomotive and details of the piston and piston-

*From an article by Capt. R. W. Hunt in the *Iron Age*, Jan. 2, 1896.



Profile of Pennsylvania Main Line (United Railroads of New Jersey Division), from Jersey City to Philadelphia, with Speed Diagrams of two Fast Runs with Heavy Trains.

rod. We now publish an engraving showing the speed diagrams and a profile of the line. In the profile only the principal changes in grade can be shown. The figures above the line of the profile show the grade in feet per mile; those below are the elevation of a few points.

The full line of the speed diagram is for the run made Sept. 18, 1895. The train was seven Pullman cars weighing 663,827 lbs.; the engine and tender weighed 204,800 lbs.; total weight, 868,627 lbs. The average steam pressure was 175.4 lbs.; the total time the injector was used

Mr. Humphreys said in his paper that the largest power seen by him, and probably the finest in the two Virginias, is in the New River cañon, where the fall is over 20 ft. to the mile and the distance about 64 miles. The smallest measurement which he took gives the total horse-power going to waste in the cañon as 442,300; but this splendid water power is located in one of the finest coal fields in the world.

It is proposed to extend this branch of the work of the Geographical Survey by making at least one measure-

SPECIAL RUN OF LOCO. 1551, CLASS "L," OCT. 21, 1895.

BLOCKS.	Actual time, p. m. H. M. S.	Time between blocks. M. S.	Distance between blocks.	Time from J. C.	Distance from J. C.	Speed between blocks.	Time.	Position of		Steam press.
								Reverse lever.	Throttle lever.	
Jersey City.....	1:14:40						1:14:40			177
R. U. Tower.....	17:35	2:55	1.07	2:55	1.07	22.01	20	12	Full	175
J. M. ".....	25:30	7:55	6.00	10:20	7.06	48.54	25	"	"	175
W. A. ".....	28:20	3:20	2.91	13:40	9.97	52.43	30	"	"	182
S. A. ".....	32:20	4:01	3.69	17:40	13.66	55.35	35	"	"	160
N. P. ".....	41:10	8:50	9.42	26:30	23.08	61.01	40	13	Full	175
R. X. ".....	46:30	4:50	4.84	31:20	27.92	60.12	45	"	"	175
New Bruns.....	48:10	2:10	2.23	33:30	30.15	61.94	50	12 1/2	"	183
Frank Park.....	53:10	5:30	4.34	39:00	34.49	47.35	55	13	Full	182
Deans.....	56:40	3:50	3.04	42:00	37.53	60.81	2:00:00	"	"	180
Mon. Jnc.....	59:00	2:20	2.49	44:20	40.02	64.12	5	"	"	176
F. N. Tower.....	2:00:28	9:28	10.27	54:05	50.29	65.14	10	"	"	179
Trenton.....	13:43	5:17	5.40	59:50	55.69	61.33	15	"	"	180
X. N. Tower.....	16:31	2:46	2.95	61:55	58.64	66.25	20	"	"	180
Edgely.....	21:31	5:00	4.89	67:00	63.53	61.33	25	19	"	173
G. F. Tower.....	22:14	0:43	0.73	67:35	64.2	60.75	30	12 1/2	Full	175
Bristol.....	24:08	1:54	1.74	69:30	66.00	53.66	35	"	"	175
R. S. Tower.....	32:20	8:12	7.60	77:20	73.60	55.61	40	"	"	175
Broad street.....	2:48:00	15:10	16.60	93:20	89.60	62.30	45	"	Shut off	180

SPECIAL RUN OF LOCO. 1651, CLASS "L," SEPT. 18, 1895.

BLOCKS.	Actual time p. m. H. M. S.	Time Between Blocks. M. S.	Distance Between Blocks.	Time From J. C.	Distance From J. C.	Speed Between Blocks.	Time.	Position of		Steam Press.
								Reverse Lever.	Throttle Lever.	
Jersey City.....	1:14:59									180
R. U. Tower.....	18:00	3:10	1.07	3:10	1.07	20.28	1:20	12	"	175
J. M. ".....	26:30	8:00	6.00	11:10	7.06	45.09	25	"	Shut off	177
W. A. ".....	29:35	3:25	2.91	14:15	9.97	49.14	30	13	"	178
S. A. ".....	33:50	4:15	3.49	19:00	13.66	52.08	35	"	"	172
N. P. ".....	43:30	9:40	9.42	28:40	23.08	58.50	40	"	Wide open	174
R. X. ".....	4:50	6:20	4.84	35:00	27.92	45.90	45	"	"	176
New Bruns.....	51:30	2:10	2.23	36:40	30.15	61.94	50	"	Shut off	175
Frank Park.....	56:40	5:30	4.34	41:50	34.49	47.35	55	12 1/2	"	176
Deans.....	2:01:00	3:30	3.04	46:10	37.53	52.12	2:00	13	Wide open	175
Mon. Jnc.....	3:30	2:30	2.49	48:40	40.02	59.76	05	"	"	177
F. N. Tower.....	12:35	10:39	10.27	57:45	50.29	58.69	10	12 1/2	Wide open	177
Trenton.....	18:45	4:45	5.40	63:55	55.69	68.22	15	13	"	170
X. N. Tower.....	21:45	3:00	2.95	66:55	58.64	59.00	20	"	"	177
Edgely.....	26:30	4:45	4.89	71:40	63.53	61.30	25	"	"	173
G. F. Tower.....	27:10	0:40	0.73	72:20	64.26	66.36	30	"	"	176
Bristol.....	28:55	1:45	1.74	74:05	66.00	59.66	35	"	"	173
R. S. Tower.....	37:09	8:05	7.60	82:10	73.60	55.44	40	"	Wide open	173
Broad St.....	2:54:35	17:35	16.00	99:45	89.60	51.60	45	"	"	175
							50	"	"	175
							2:54:35	"	"	180

was 1 hr. 12 min. 25 sec. The time of the run was 1 hr. 39 min. 45 sec. The average speed from Jersey City to Philadelphia was 53.88 miles per hour, and from Princeton Junction to Mantua (40.8 miles) the average speed was 60.48 miles per hour.

The dotted line on the speed diagram shows the run made Oct. 24. In this case, the train was six Pullman cars weighing 548,657 lbs.; the engine and tender weighed as before, and the total was 753,457 lbs. The average steam pressure was 177.6 lbs., the total time the injector was used was 1 h. 16 min., and the total time of the run was 1 h., 33 min. 21 sec. On this trip the scoop failed to pick up water at Monmouth and the engine was not worked to full capacity over the Bristol trough. The average speed from Jersey City to Philadelphia was 57.6 miles per hour, and from Princeton Junction to Mantua it was 62.24. Details of time, distances, positions of levers and steam pressure are given in the two tables.

Water Power in Virginia and West Virginia.

Mr. D. C. Humphreys, of the Association of Engineers of Virginia read before that body a few weeks ago a paper which had for its subject "Stream Measurements and Water Power in Virginia and West Virginia." It describes the work of investigating the water-power resources of the two states mentioned so far as such work has been carried out. Stations have been established and measurements are being made on the Potomac, at dam No. 6 near Great Cacapon, W. Va.; on the South Branch at Springfield, W. Va., and on the main river again at Cumberland, Md., and at Point of Rocks, Md., as well as at Chain Bridge, D. C. There is also a station on the Shenandoah near Millville, W. Va., on New River at Lafayette, W. Va., on the Greenbrier at Alderson, W. Va., on the James at Buchanan, Va., on North River, of the James, at Glasgow, Va., and on North and South rivers of the Shenandoah at Port Republic, Va. The observations at each station consist of two parts: first, the river height is daily read by a gage reader who lives near the station, a weekly report being transmitted to Washington. Second, the relation must be established between river height and discharge per second. When this is once done all that is necessary in order to determine the quantity of water flowing per second is to measure the river height or read the gage, the discharge being at once determined by means of a rating table or diagram. The stations are chosen at places where the cross-section and channel above and below are permanent in order to insure trustworthy results.

To establish the relation between gage reading and discharge, measurements must be made at different stages from extreme high water to extreme low water, establishing points along the curve expressing such relation.

ment of each river or creek that may be useful for water power at as nearly low water mark as possible. This will give the critical point in regard to each stream.

Temperatures at Great Depths.

Prof. Agassiz, in the *American Journal of Science* for December, gives some results of a series of tests which he has been making of rock temperatures at great depths in the Calumet & Hecla mines. The greatest depth so far obtained there is 4,712 ft., and the temperature has been taken at 105 ft., 655 ft., or the depth of the level of Lake Superior; at 1,257 ft., or the level of the sea; at 1,663 ft., a depth equal to that of the deepest part of Lake Superior, and at four additional stations, each respectively 500 ft., 550 ft., 561 ft. and 1,256 ft. below the preceding one. The deepest point at which temperatures have been taken was 4,580 ft. It is proposed to take a last reading, when the final depth of 4,900 ft. is reached, and at that time the details of the observations will be published in full. In the meantime, some of the results obtained are interesting. The highest rock temperature obtained at the depth of 4,580 ft. was only 79 deg.; that at 105 ft. was 59 deg., which makes the average increase 1 deg. of temperature 223 ft. Lord Kelvin had found this to be 51 ft. for a change of 1 deg. of temperature, and the observations in the St. Gothard tunnel gave results of 60 ft. for a similar change. Calculations based upon the latter observations make the crust of the earth approximately 20 and 26 miles thick. Prof. Agassiz's observations make the crust over 80 miles thick, and give a temperature at a depth of 19 miles of only 470 deg., the older ratios showing for this depth 2,000 deg. Perhaps these results would indicate different thicknesses of the earth's crust at different points on the earth's surface.

Heating Private Cars.

Owing to the rather complicated system of pipes for heating and toilet purposes in private cars, it is a difficult matter to adapt the use of steam for both warming the car and heating the water for toilet basins, etc., so that the car may be properly heated under all conditions, and allow of either the steam or a fire being used at any time or both at the same time. The Gold Car Heating Co. has been successful this winter in heating this class of cars, among them the private car of President Ingalls, of the "Big Four," and the Chesapeake & Ohio, the car of General Manager Schaff, of the "Big Four," and the car of Mr. H. H. Porter and the business cars on Chicago & Eastern Illinois, and on the Nickel Plate. The apparatus is controlled by a single steam valve in the stove room, and is so arranged that either steam or fire in the Baker heater may be used, or both steam and fire may be used at the same time if desired. The entire apparatus except the train pipe is inside the stove room, and cannot freeze up.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

An injunction has been asked against the Joint Traffic Association and a hearing will be given by the United States Circuit Court in New York City to-day, January 17. The Association and the railroads have been notified to make answer to the complaint about February 1. The published statements concerning the bill of complaint, indicate that the District Attorney depends chiefly on the Sherman anti-trust law to support his argument. There is mention of a purpose on the part of the railroads to "combine their freight and divide their earnings or some portion thereof," but this clause seems rather indefinite. The Sherman law (July 2, 1890) declares that "every contract or combination in restraint of commerce among the States is illegal." It appears that an impression has been obtained in some quarters that section 2 of article 9 of the Joint Traffic agreement authorizes pooling. This section allows the managers "to determine the divisions of rates and fares between connecting companies." The only way to give this the color of an offense against the anti-pooling law is to assume that "connecting companies" means competing companies, and that "fares" meant earnings; it might not be impossible to sustain this view, technically; but in point of fact this section was put into the agreement for the purpose of regulating the division of rates over two or more sections of a continuous line. For instance some very serious rate cutting has been effected in years past by irregular action concerning the proportions allowed to intermediate roads in a line, on freight from Mississippi River points to the Atlantic seaboard. Such intermediate roads being in the territory of two associations, they could be allowed an unreasonably large share of the revenue, and this surplus could be used to pay a rebate to the shipper. The section referred to was inserted, with this end in view, to be used by the managers "when in their judgment it should be necessary to the purposes of the agreement." The Board of Managers of the Association have had ten or a dozen meetings, and we understand that their deliberations have proceeded very smoothly. The Board of Control was to meet on Jan. 16 to arrange for the defense to be presented in the court.

The gross earnings of the railroads for the year 1895 have now been collected and tabulated by *The Chronicle*, the returns covering in all 204 railroads. Of these, reports are received from 123 roads for the full year and from the remaining roads for 11 months. The gain for the 204 roads is a trifle short of \$50,000,000, and is practically 6 per cent. The comparison is, of course, made with a year of very heavy losses; that is, in 1894 the decrease in gross earnings was almost 112½ million dollars; in 1893 the decrease had been over 25 millions. Consequently, the gain in 1895 is only a step in the recovery of what was lost in the two preceding years, but still it is an important step. It was somewhat more than the increase of 1892 over 1891 and also somewhat larger than the increase of 1891 over 1890. An encouraging feature of the situation is that for the month of December the gain was more than in any other month in the year except July

and the July comparison was made with a month when nearly all the railroads of the country were suffering from a great strike. The December gains amount to 9.15 per cent. Much the heaviest gains shown by any individual road are on the Pennsylvania system, which shows for 1895 an increase of more than 9½ million dollars. The Reading and the Coal & Iron Company gained 3½ millions; the Great Northern almost 3 millions; the New York Central 2½ millions; the Northern Pacific 2½ millions; the Illinois Central and the St. Paul each over two millions. The Chicago & North Western for 11 months gained more than 1½ million dollars, as did the Southern Pacific, and the Baltimore & Ohio gained almost 1½ millions. The Lake Shore for 12 months gained 1½ millions. The decreases are not numerous, but some of them are important. The Rock Island, for instance, fell off \$980,000; the Norfolk & Western, \$347,000, and the Union Pacific declined in 11 months over one million. The Chicago, Burlington & Quincy is also among those roads which earned less in 1895 than in 1894; its decrease for 11 months was, however, only about \$127,000. Of course the big spring wheat crop was an important element in the gains, and particularly for the roads of the Northwest. The receipts of wheat at Chicago were five millions of bushels less in 1895 than in 1894, but the aggregate receipts of grain there increased seven millions. At the Western primary points the aggregate increase in grain movement was 20 millions, not a very great showing to be sure. The provision movement at Chicago increased a good deal. The gain in cut meats was about 34 million pounds, and there was a small increase in the number of hogs. The number of cattle received at Chicago was about 500,000 less than in 1894. The receipts of grain at the seaboard were somewhat greater than in 1894, but not materially so. The cotton movement fell off a good deal, which, of course, accounts largely for the losses by some of the Southwestern railroads.

Ten-Ride Tickets.

As noted in recent Chicago letters in our traffic columns, the roads between Chicago and St. Paul have had much discussion over the abuse of 10-ride tickets, and, it appears that the difficulty is not yet settled. According to the statements of the reporters, the Wisconsin Central persists in selling party rate tickets at two cents a mile, to anyone applying for them; scalpers buy them and use them as a means of reducing the through fare a dollar or two to single passengers, and thus disturb all passenger rates. The Rock Island made the first complaint, but it is said that the only way the Rock Island line could meet the competition would be to sell single tickets at the reduced rate. Some of the roads wish to make a rule restricting 10-ride tickets to theatrical parties, but the counsel of the Wisconsin Central very properly replies that that would be illegal, being a discrimination against other parties of ten. Another proposition was to discontinue the 10-ride tickets between Chicago and St. Paul, but not in other territory served by the same companies; but that is also held to be so much of a discrimination that it would probably be called illegal. To abolish all party rates in the Western Passenger Association would be objected to by those roads which have no trouble with them. The two strong lines between Chicago and St. Paul object to a general reduction on single fares, to meet the Wisconsin Central cut, and so no settlement has been reached. Although theatrical parties, who are the chief beneficiaries of party rate tickets, do not constitute a very large proportion of the total passenger business of any road, they are well entrenched in their privileges, long established by custom, and it is probable that most general passenger agents would put up with a good deal of inconvenience in other directions rather than make a break with these critical customers. That the theatrical men have the power to exert a good deal of pressure is evidenced by the favorable rates they succeed in getting out of the roads for their heavy and bulky baggage.

The remedy for the troubles recounted in the foregoing paragraph, like the remedy for most of the evils connected with ticket scalping, is exceedingly simple when once the courage is found to apply it. In this case we doubt whether the difficulty has been fully and fairly stated. The innocent reporter, who has gathered the alleged facts, says that the scalpers buy a 10-ride ticket and hold it until they collect a party of 10 passengers, which leads to the inference that the Wisconsin Central is unable to help itself if it would. It can virtuously reply to its accusers that it hates the scalpers, but cannot distinguish a scalper from the manager of a camp-meeting excursion, when he applies for a party rate ticket. This may be so, but unless the volume of passenger traffic between

Chicago and St. Paul is very much heavier than we ever supposed it to be, the scalper would have to wait several weeks before he would find 10 passengers ready to go to the same destination on the same train and willing to put themselves to the necessary inconvenience for the sake of saving only a dollar or two. The conclusion is irresistible that there must be some understanding by which conductors accept a 10-ride ticket on 10 different trains. Such use of the ticket is nothing but a travesty on the legitimate party-rate principle, and the remedy for the present difficulty is too obvious to need stating; a party rate is for a party, not for a number of detached individuals.

Even legitimate party-rate tickets are, however, a good deal of a nuisance, and it would be much to the benefit of the St. Paul roads, and their passenger business as a whole, if the present disturbance could be settled by the entire withdrawal of 10-ride tickets, as has been proposed. If the whole public is to be dealt with on terms of equality the only warrant for selling ten tickets in a lump for less than is asked for ten single tickets is to be found in the principle that large transactions can be conducted at less cost than small ones; but how far does the wholesale principle apply in this case? (The excursion party comes down to only five in cases where a 10-ride ticket is used for a round trip.) Generally the only saving in cost to the road is in the labor of the ticket seller, which is almost nothing, and may be offset by the additional printing and accounting necessary. In the case of a theatrical party the additional baggage makes the cost of carriage probably higher than for any ten ordinary passengers, and the extra charge for the baggage quite likely does not adequately remunerate the road for the extra cost. It is true that most regular passenger trains can take ten additional passengers and their baggage without using a bushel of coal additional (though sometimes two extra cars, one passenger and one baggage, are needed); but in either case the ten-ride discount may be looked upon as a bid for custom, purely.

How far this is justifiable is a question depending a good deal upon the reasonableness of the single fare rate and the feeling of the public in the matter. The government would not think of selling two-cent postage stamps at a discount to concerns who send a large number of letters, for the feeling aroused among those who paid full rates would create too great a disturbance. No doubt there are theatrical companies which do travel at 25 per cent. discount which would never dare to take the first step out of their New York boarding houses if they had to pay full rates, and the railroads may make some money by taking such companies at whatever rate (above cost) will get them; but neither the Interstate Commerce Commission nor the courts could be expected to encourage such a concession, unless it were open to everybody, for this class of thespians do a town more harm than good, and true public policy would require their fare to be higher than those charged to ordinary useful citizens.

Where the single-ticket rate is low, as on the New York, New Haven & Hartford, discounts are small and sparingly given. Where the fares are higher discounts must be granted more freely both to meet the reasonable demands of the public and as a concession to the unreasonable demands which may take the shape of legislative enactments. But it would be a great mollifier of public sentiment if in this latter case the gross reduction could be applied to all alike. If a railroad gives special rates enough in a year to reduce its average receipts two mills a mile, it does indeed benefit the public to that extent, and it can boast of the fact in its annual reports; but the entire suspension of special rates and a reduction of two mills on regular fares would accomplish the same result theoretically and, we believe, be equally satisfactory practically; the entire traveling public, instead of a few special classes, would know of the reduction and feel more or less grateful for it. Probably the reduction ought to be postponed until it could be made five mills instead of two, but if the policy of the company were well settled and well known that would not be difficult.

The arguments may be summed up by saying that the use of party rate tickets for small parties is a harmless means of making small concessions, which will make no trouble as long as the variations in prices really are small. There is no great preponderance of evidence either for or against making a discount in this way. Interstate Commerce Commissioner Veazey, in his opinion in the Baltimore & Ohio case, in February, 1890, came to the conclusion that a party rate ticket was so liable to make just such a disturbance as it has now made in the Northwest, that it ought to be declared illegal; and by putting a rather arbitrary construction on the language of the Interstate Commerce law he made out that such tickets were contrary to the law; but Judge Jackson, in the Circuit Court at Cincinnati, in August, the same year, re-

versed this decision. Both Veazey and Jackson recounted the arguments pro and con at great length, but the reader gets from their discussions the impression that after all both men reached their decisions on what appeared to them common-sense ground, rather than upon specific considerations.

In favor of 10-ride tickets it may be said (1) that sometimes a road can thereby induce people to travel when they would not go at full rates, and (2) that no substantial injustice is done to other passengers. If a man and his wife with eight grown-up children wish to travel in a single party no one should object to the small concession which the wholesale principle can be made to give them. Moreover, a practical argument in favor of the employment of the wholesale principle is found in the fact that we cannot get rid of it if we would. It is deplorable that poor people have to pay \$20 a ton for their coal when the wealthy can get it for \$5, but how can the evil be remedied?

In objection to party rate tickets the principal point is that a low rate, made simply to "move traffic"—simply to get people to travel, who without a special inducement would stay at home—always irritates the other people who pay regular rates. This feeling, howsoever illogical is cherished with sufficient tenacity to sustain a very live grievance whenever a grievance is wanted. Second, if once this discrimination is allowed, there is a constant tendency to make it larger than it ought to be. As the country and the railroads grow, and as people come to more fully realize the fact that a railroad performs a public service, the more general is the demand that the lowest rates be applied to small transactions as well as large. The railroads themselves do apply this principle, and necessarily, to a considerable degree, in much of their local business, and that tends to confirm people in their belief that it is right, and that they ought to have more of it.

Annual Reports.

Philadelphia & Reading.—The report of the Philadelphia & Reading Railroad and of the Coal & Iron Company for the year ending Nov. 30 was made public this week. The main results are as below:

<i>From the Railroad.</i>	
Gross earnings.....	\$21,300,575.13
Expenses.....	11,628,111.77
Earnings from traffic.....	\$9,672,463.36
Profit from other sources.....	587,089.46
	\$10,259,552.82
Deduct:	
Rentals.....	\$2,884,851.50
Interest account.....	5,058,779.10
Profit and loss.....	252,028.05
Taxes.....	135,634.21
Terminal trackage.....	453,983.75
Equipment payments.....	1,013,813.67
Improvements.....	122,976.50
	\$9,922,066.87
Surplus.....	\$337,185.95
<i>From the Coal & Iron Co.</i>	
Receipts.....	\$24,030,798.60
Expenses.....	21,780,607.81
Loss.....	\$399,849.81
Interest.....	1,176,182.18
Deficit.....	\$1,875,991.39
Deficit for the two companies.....	\$1,538,805.44

The receipts for three years were as follows:

	1895.	1894.	1893.
Coal Traffic.....	\$9,957,370	\$3,752,296	\$11,295,849
Pass. Traffic.....	8,917,469	5,992,373	6,722,031
Pass. Traffic.....	3,849,072	4,137,960	4,349,132
Miscellaneous.....	375,403	363,263	376,621
Mail.....	97,759	98,840	83,190
Total	\$21,300,575	\$20,344,775	\$22,828,846

The ton-miles increased 16.3 per cent. The total coal produced was 8,633,000 tons, or 575,000 tons more than in 1894, and 553,000 tons more than in 1891, the year of greatest production. The coal cost \$1.414 on the cars; or allowing for permanent cooling improvements \$1.339—the lowest cost since 1879.

The passenger earnings fell off \$178,888, which loss, the report says, came wholly from the competition of the suburban electric railroads. The passenger mileage was almost exactly the same as in 1894, the long journeys having increased as the short ones decreased.

During the year 1895 new equipment was purchased to the amount of 1,000 thirty-ton coal cars and 349 twenty-five-ton coal cars and 200 gondola cars which had been in the company's service for several years were purchased on favorable terms. Considerable increase in the coal car equipment will be necessary in the near future, and while not many new locomotives will be required the coming year a few freight and passenger cars will probably have to be purchased.

The report devotes several pages to a discussion of the efforts to adjust the differences in the coal trade, which, as we all know, have failed because the Reading was not willing to accept the percentage that the other companies were willing to allot to it. A brief statement of the pending plan of reorganization is made.

Our criticism of the proposed use of telephones on the Brooklyn Bridge for the purpose of communicating between the trainmaster and the grip men of moving cars

published Jan. 3, is objected to by an officer of the bridge, who says that, in the experiment referred to, a communication was sent to the trainmaster's office and a signal exhibited in four seconds instead of 14 seconds, as was stated in the account from which we took our facts. The communication of our critic shows, however, that the proposition to use telephones is not based on the idea of using them strictly as a safety device, in the sense in which a block signal is used, but rather for convenience. The Assistant Engineer of the bridge, Mr. Kingsley L. Martin, who recommended the introduction of telephones, clearly recognizes the limitations under which his scheme would have to be used. In his report to the Superintendent, outlining the needs of the service, he said:

"Suppose a train going out of the Brooklyn station runs up the grade and finds that owing to some failure of the grip mechanism it cannot get over the summit. The conductor at once states this fact to the trainmaster through his telephone. The trainmaster presses the button and all the gates are closed and the sale of tickets stopped. He at the same time rings his telephone bell and informs the train crews that a train is coming back. Each crew then knows there is a 15 minutes delay and they are ordered to run down and land their passengers on the preceding train. The trains behind the one in trouble are ordered to stop and return slowly and as a locomotive is sent out after them in turn. This instantaneous intelligence of the exact situation would be an immense improvement over that furnished by the present method or any other that has been suggested. Its advantage in a dense fog would be incalculable.

"In case the cable should become stranded, word could be instantly sent to the trainmaster by the conductor observing it and the engines at once stopped. If the train should lay the cable off the sheaves, if any part of the grip or brake mechanism should be deranged, the trainmaster could be at once notified and by the time the train reached the station another train would be ready to go out in its place and arrangements made to lay the first up in the yard. If trains are stopped or delayed at any point the trains following could be at once notified and cautioned."

While any means of instantaneously communicating with the trainmaster would always be a great convenience and a satisfaction to the passengers, and would often enable the conductors to act more intelligently in getting out of a tight place, it could not be depended upon to surely stop a train within 45 seconds, the proposed time interval, or within any definite time. If dependence were to be placed on such a means for absolutely stopping a train which was in danger of running into the train ahead of it, a fundamental principle of signaling would be violated, for the right to proceed would be given by the absence of a signal, that is by the silence of the train master.

The Chairman of the Congressional (House) Committee on Interstate Commerce, Mr. Hepburn, of Iowa, has under consideration a bill to amend the Interstate Commerce law, which has been prepared by Mr. Knapp, one of the Commissioners; and, after conferences with Mr. Patterson, of Tennessee, whose bill was passed by the House last year, and Mr. Cowen, of Baltimore, now a member of the House and long known as counsel of the Baltimore & Ohio, has got the bill nearly in shape to be reported. According to the correspondent of the *New York Journal of Commerce* "the railroads agree to most of the provisions of this bill," though how the views of the railroads have been found out does not appear. One of the perplexities connected with the bill, according to this correspondent, is the question concerning the construction of the word "line." Judge Brewer decided, at St. Paul, Oct. 17, 1892, that the long-and-short-haul clause of the law could be evaded by assuming that a through freight "line" was something entirely distinct from another freight line, through or otherwise, running over the same rails, and it appears that some of the railroads desire to take advantage of this absurd ruling in order to avoid complying with the plain intent of the law; but the Interstate Commerce Commissioners want a law plainly setting forth that "line" means a physical line. They are not to be criticised for this, for they are only carrying out the obvious intent of the original law. It is true that in a great many cases the interest of a railroad demands the suspension of the long and short haul section, and that such suspension would work no injury to the public or to any shipper, but if there is no other way to get around the law, except by the fantastic expedient adopted by Judge Brewer, the attempt might as well be given up. The correspondent referred to says that the railroads are willing to allow the Interstate Commerce Commission to supervise pooling contracts, as fully as the Commissioners may desire. It has been said that the Commissioners desired full power in this matter, "for use as a club to compel the railroads to obey orders under other sections of the act"; but the railroads, it is said, believe that this power could not be wielded unreasonably without a loud protest from the public.

A bill has been introduced in Congress by Senator Caffery, of Louisiana, "to facilitate securing evidence against monopolies," in which there is a provision placing the administration of the law in the hands of the Interstate Commerce Commission. Mr. Patterson, of Tennessee, has introduced in the House a bill to amend the Interstate Commerce law which, according to the reports, seems to be the same one introduced by him at the last session, which was passed by the House, but not by the Senate. A bill has been introduced in the Virginia Legislature to create a railroad commission of three members, with power to fix rates; and another one requiring all railroads, including street lines, to pro-

vide separate and equal accommodations for white and colored passengers. In the New York Legislature a bill has been introduced designating bicycles as baggage and requiring railroad companies to transport them as such; also a bill to regulate fares on street surface railroads. Another bill forbids any railroad to charge more than five cents for a fare within the limits of a single city.

Probably few of our readers realize the great membership of the Institution of Civil Engineers (British). This organization was established in 1818 and incorporated in 1828. The membership on the first of this year amounted to 6,794 members of all classes, the increase in the last ten years having been 36½ per cent. Of this membership 3,750, or more than half are Associate Members and the Members are 1,854, or a little over one-quarter of the total. These two grades constitute the corporate membership, as in the American Society of Civil Engineers. The student membership is large, numbering now 825. The requirements for corporate membership are not as severe as they are in the American Society of Civil Engineers, but of course the real test of qualification lies with the officers of the society who pass on applicants for membership, rather than in the text of the constitution; for everyone knows how widely men will differ in their interpretation of any written text. We are inclined to think that on the whole it is more difficult to get into the American Society of Civil Engineers than into the Institution, or, at any rate, that it has been so in recent years. The American Society now contains about 1,900 members in all grades, and both bodies are most important influences in the civilization of the two countries.

NEW PUBLICATIONS.

Rapalje & Mack's Digest of Railway Law, Vol. 3. Published by Edward Thompson & Co., Northport, L. I.

The third volume of this digest of railroad decisions noticed in the *Railroad Gazette* of June 21, 1895, has been issued. This volume contains the decisions embraced between "Citizenship" and "Decree." The commendation of the first two volumes need not be qualified or limited in respect to the present volume. The proportions of the work, we think, exceed those of any of the same character, and when the undertaking is finally completed it will be a masterpiece. Among the interesting topics digested are Connecting Lines, Consolidation, Construction of Railways, Comparative Negligence, Crossing of Railroads, Crossing of Streets and Highways, Injuries at Crossings, and the ever fruitful and interesting theme of Damages.

Under Connecting Lines we have decisions showing what they are; then the right of one road to connect with another, both under the statutes of the particular states as well as from the more general standpoint, and then the Interpretation of Agreements between companies establishing Connecting Lines and the Validity of such Agreements from the standpoint of Power to Contract and Public Policy. Consolidation and Amalgamation are treated with considerable particularity, the analysis adopted being exceedingly useful in enabling one to find any particular decision which has been made on the subject.

Construction of railroads will be found to have been treated with great care and to have been elaborated in a way to be of great use to the non-professional reader who wants to gain a general idea of the trend of judicial thought on this particular subject.

It serves as a good illustration of the thoroughness of the work to note the fact that we have not only the topic digested of Contributory Negligence embracing 125 sub-topics, each of which includes a number of decisions digested, but also a special topic on Comparative Negligence, which probably embraces as many highly technical decisions as any other topic in the whole law of negligence. This article not only contains cross references to other parts of the work already published, but considers the subject from the standpoint of the Illinois doctrine, giving statements and explanations of the rule with illustration of the application of the doctrine, evidence, instructions and questions for the jury and also considers the subject from the standpoint of other jurisdictions.

The subject of Crossing of Railroads is treated with such particularity that the space devoted, including the specific subjects of Crossing of Streets and Railways and Injuries on Crossings, would require a volume of good size if published separately. The same may be said of the topic Death by Wrongful Act, which not only abounds with cross references but furnishes a very satisfactory and complete analysis of the whole subject. Considering the doctrine under the common law, under statute, and the general law which may be considered an improvement upon the Common Law and treated independently of the Common Law and Statute Law, the topic embraces the Right of Action, The Wrongful Act, Who may Sue, Limitations of Time to Sue, the Jurisdiction and the Law of Place, Pleading, Evidence, Instructions, Verdict, Damages and Criminal Proceedings.

The head of damages under this topic is exceedingly well digested. Passing the statutory Provisions and Limit of Amount, we come to the Elements and Measure of Damages, and under this sub-division of a sub-head is considered the subject from the general standpoint, and specially as follows: Pecuniary Loss to Beneficiaries, Death of Parent, Death of Husband, Death of Wife,

Death of Child, Medical and Funeral Expenses, Prospective Damages, Exemplary Damages, Nominal Damages, Excessive Damages and Interest as Damages.

The volume abounds with other topics quite as satisfactorily though perhaps not so elaborately treated as those mentioned. Paucity of digest is not, of course, to be always attributed to defect in the work. The analyzer must be supplied with material for analysis, and if there are none, or but few decisions on a given subject, we cannot blame the author.

American Machinist.—At the annual meeting of the stockholders of the American Machinist Publishing Company, held in New York, Jan. 13, the following officers were elected: Angus Sinclair, President; Fred J. Miller, Vice-President; John A. Hill, Treasurer and Managing Director, and C. A. Hansman, Secretary. This is a change of management brought about by Messrs Sinclair & Hill, proprietors of *Locomotive Engineering*, having bought the control of the capital stock of the American Machinist Publishing Company.

TRADE CATALOGUES.

Malleable Iron Castings.—The National Malleable Castings Co., of Cleveland, Chicago (Old Colony Building), Indianapolis and Toledo, has issued a beautiful catalogue showing its railroad wares. This catalogue is 116 pages, quarto size, with a good alphabetical index, bound in cloth. Of course it would be quite impracticable to attempt here any account of the very great variety of articles shown. It is sufficient to say that everything for a car that could be made of malleable iron is made by this great concern, and many of the illustrations show the substitution of malleable castings for wrought forgings. The articles to which especial attention is called are the Tower coupler, the National and the Eubank car door fixtures, the National center plate, the National journal box and journal box lid and Coffin's sill and brake box pockets. The various articles made are shown by half tone engravings from photographs under each of which is a brief description of the article. These illustrations are sufficient to give a very accurate idea of the design and dimensions of the various parts. The only line drawings in the catalogue are of the Tower coupler in all its details, and of the Eubank car door. These are both described in considerable detail, as well as carefully illustrated.

Link Belt Machinery.—The Link Belt Machinery Co., Nicetown, Philadelphia, Pa., issues a preliminary part of its general 1896 catalogue. The complete catalogue will be published early in the year. This preliminary part is devoted to "Monobar," a quite recent design of chain for conveyors. It was patented in 1893. This chain is made up of a series of wrought-iron bolts which are connected by malleable castings, which castings form the socket and knuckle for the continuous chain and the bracket for attaching the flight. The arrangement is singularly workmanlike, and the chain so made is said to be lighter for its strength than any other form now in use. This chain was got up especially for long and heavy-duty conveyors. The same catalogue shows a new form of flight with thickened edge to give greater wearing surface. It shows also a few other details, and gives price lists of chains and parts.

Steam Drying.—The Paul Steam System Co., 10 and 12 Federal street, Boston, Mass., sends us a small pamphlet describing the merits of the Paul system of drying by steam. This is applicable to all steam drying operations, including those which concern railroad men. By this system exhaust steam is used for drying at or near atmospheric pressure. This is accomplished by continuously removing the air from the dryers, allowing the steam to flow in to take its place. Equally good results are obtained by the use of exhaust steam or of live steam reduced to atmospheric pressure. The Paul system is designed to constantly remove the air which collects in the dryers as well as to automatically drain the water of condensation. Thus exhaust steam is used without back pressure.

Curtain Fixtures and Textile Fabrics. The Brussels Tapestry Co., Chauncey, N. Y., 1896. This company has just issued a little catalogue illustrating its textile fabrics as applied to curtains for railroad and street car windows, berths, etc., also its new "Perfect" self-adjustable curtain fixture, which is a new form of adjustable curtain intended particularly for railroad and street cars. The catalogue is well printed on excellent paper, and is of a convenient size.

New York Railroad Commissioners' Report.

The State Railroad Commissioners of New York, Samuel A. Beardsley, Michael Rickard and Alfred C. Chapin, have issued the first part of the 13th annual report of the Board. The usual summary of statistics is given. The length of railroad in the state is 8,032 miles, an increase of 40 miles over the previous year. The statements of traffic and earnings are for the whole of the lines of the companies reporting, and therefore are not instructive as regards the state of New York, or for any well defined territory. The figures made up from the reports of the street (surface) railroads (the lines of

which are wholly within the state) are as follows (cents omitted):

	Year ending June 30, 1895.	Year ending June 30, 1894.
Capital stock	\$89,683,580	\$88,261,958
Funded debt	80,180,423	77,574,719
Unfunded debt	12,056,519	9,216,834
Cost of road and equipment	170,647,265	161,007,474
Gross earnings from operation	25,477,327	23,911,025
Operating expenses	16,628,451	15,418,847
Net earnings from operation	8,848,775	8,492,177
Income from other sources	945,080	576,021
Taxes and miscellaneous	1,495,172	1,000,211
Interest	2,911,115	2,367,060
Rentals	3,610,245	3,301,896
Dividends	1,993,772	1,577,107
Surplus for the year	171,130	812,967

The amount of business before the Board during the past year has been greater than ever before, and meetings have been more frequent. Every matter appealed to the general term of the Supreme Court has been decided in favor of the Board. The Commissioners have not found it necessary to go to the Attorney-General for the enforcement of any recommendation during the year. No freight overcharge claim of any consequence came before the Board during the year. One of the passenger complaints was that against the Staten Island Rapid Transit road for giving rebate tickets which must be redeemed within one hour after receipt. The report refers to the new Joint Traffic Association with approval. Under the head of physical condition of roads it is stated that facing point switches are being eliminated "as rapidly as possible." The practice of spiraling and relining curves by instrument is receiving greater attention, as is also the proper elevation of outer rails. The old "rule-of-thumb" method of adjusting curves has given way to modern scientific formula, and the principal roads are placing and keeping curves in better adjustment. [This reminds us of the remark recently made by the chief engineer of a prominent New York road, that his roadmasters could make their curves ride smoothly at high speed by the exercise of knacks of their own better than by any rules that he could give them.] The commissioners say that derailling switches for sidetracks on grades are coming into more general use, especially on single track roads. Interlocking and safety devices "are rapidly being put in at dangerous points," the improvement in this direction being particularly noteworthy during the past year. Tie plates have been extensively used during the past year with good results. Many troublesome and dangerous trestles have, upon the recommendation of the Board, been completely filled in; the New York, Ontario & Western has put in a new steel trestle 850 ft. long, and is building another 1,000 ft. long.

Former recommendations concerning the elimination of grade crossings are renewed and the Board is of the opinion that where an electric railroad proposes to cross an existing steam railroad there should not be a grade crossing. Of the 241,844 freight cars owned in the state, 51,136 are now equipped with air-brakes and 116,094 with automatic couplers. Few freight trains are now made up that do not contain a sufficient number of cars equipped with air-brakes to enable the engineer to control the train in case of emergency. When the grab iron law went into effect July 1 last the agents of the Interstate Commerce Commission inspected trains and several were detained because not fully equipped according to law. Thirteen persons were killed and 14 injured during the year by having their feet caught in guard rails or frogs, and the Commissioners earnestly recommend the use of an efficient block. For two years there has not been any rear collision of passenger trains on any road using the absolute block system. The Board received only one complaint of fire caused by a locomotive.

The casualties for the last three years were as follows:

	1895.	1894.	1893.
Killed	694	723	742
Injured	1,125	1,821	2,288

The Commissioners estimate that fully one-half of the injuries may be characterized as trivial. The number of persons killed during the year from causes beyond their own control was 62, and only one of these was a passenger. Five passengers, 4 employees and 45 other persons were killed on street surface railroads (other than horse railroads) during the year. This is only about two-thirds as large as the number reported in 1894. On all street surface railroads there were killed during the year 59 persons and injured, 247. A comparison is made with the statistics of the state of Pennsylvania, from which it appears that the number of persons killed on (steam) railroads was more than twice as large in that state as in New York. The number of injuries was about nine times as large. [As the railroad mileage and train mileage do not differ in anything like so great a percentage, the difference in the number of persons injured leads to a suspicion that the basis of reporting is not the same in both states.—EDITOR.]

Referring to the large number of trespassers killed (nearly one-half of the total fatalities) the report speaks of the lax enforcement of the laws on this subject. It is believed that this negligence is chargeable to the local magistrates, as the railroad companies make fairly successful efforts to expel trespassers from their station grounds.

Ten roads within the state have been taken out of the hands of receivers during the year. The Commissioners believe that the restricted regulations under which the railroads now sell mileage tickets fail to meet the reasonable demands of the law requiring such tickets to be sold, and they have notified the companies to this effect. The law regulating the issue of new stock by railroads ought to be made more strict, like that of Massachusetts.

Fenders for street cars are still unsatisfactory and the ideal fender has not been invented; but a simple device, used by one road operating 146 miles of track, has been quite successful, and the Board warns railroads not to relax their efforts to get the best device possible. A speed controlling device is now in successful operation on the cars of the Buffalo & Niagara Falls electric street road. The methods of street railroad accounting have been revised by the Board. The report contains a brief description of the Park Avenue improvement on New York Central in New York City and the grade crossing improvement in Buffalo. The total estimated cost of the latter is given at \$4,956,165, of which the city of Buffalo will pay \$873,670. The total cost to the railroads will, therefore, be \$4,082,495, divided as follows:

New York Central & Hudson River and West Shore	\$2,016,927
New York, Lake Erie & Western	917,594
Lake Shore & Michigan Southern	339,412
Western New York & Pennsylvania	123,253
Buffalo Creek	145,063
New York, Chicago & St. Louis	123,960
Union Terminal	57,216
Delaware, Lackawanna & Western	59,071
Total	\$4,082,495

When completed, the entire improvement will consist of eighteen viaducts carrying streets over railroad tracks, and nineteen subways carrying streets under railroad tracks. In addition there will be a beam tunnel carrying the tracks of the New York Central through a cut in the terrace under Main Street. The general scheme of dividing the cost of the work is that railroad companies pay the cost of all work which is done over their tracks or right of way, if the work be a viaduct, and of all work under their right of way, if the work be a subway. The cost of the approaches in either case is divided between the city and the railroad companies, the city paying one-third and the companies two-thirds. It is expected to take three or four years for the completion of the improvement.

The recommendations for new laws are summarized as follows: When street surface railroads apply for a certificate of public convenience and necessity, a law empowering the Board to certify to the whole or a part of the proposed route, or to compel an existing corporation to build such additional line if deemed necessary; further restricting the issue of stock and bonds by railroad corporations; prohibiting grade crossings and providing for the abolition of those already established; compelling passenger cars to be lighted by gas or electricity; compelling the blocking of guard rails and frogs; more clearly defining the character of fences to be erected by railroad companies; compelling the use of fenders on street surface cable or electric cars, and generally regulating the operation of such roads as to speed, use of air or power brakes and other safety appliances; prescribing a penalty for failure to file quarterly reports within a specified time.

TECHNICAL.

Manufacturing and Business.

Burnham, Williams & Co., of the Baldwin Locomotive Works, Philadelphia, have admitted Samuel M. Vauclain, Alba B. Johnson and George Burnham, Jr., to partnership in the firm.

The Franklin Steel Casting Co. will start up its works as soon as some shafting and other necessary machinery arrives and can be put in position. An additional furnace will be put in at once. Present orders will cover the capacity of the plant for much of the year.

The general offices of The Sargent Company have been removed to No. 675 Old Colony Building, Chicago.

The Gilbert Iron and Steel Manufacturing Company, of Harrisburg, was chartered on Jan. 9, with incorporators L. D. Gilbert, W. U. Hercher, A. J. Simms, Charles Beaver and Frederick Long, all of Harrisburg; capital stock, \$35,000.

Thomas H. Spaulding and Robert E. Jennings, manufacturers of steel in Jersey City, as the West Bergen Steel Works, made an assignment Jan. 10. It is said that the trouble is only temporary, and that creditors will be paid in full in time.

The Virginia Bridge & Iron Co. has been incorporated at Richmond, Va., the officials being as follows: Samuel W. Tasewell, President; C. Edwin Michael, of Roanoke, Secretary and Treasurer, and C. C. Wentworth, of Roanoke, Chief Engineer. This concern has purchased the plant and succeeds the American Bridge Co., whose works at Roanoke have been idle since last March. Some contracts have been secured, and it is expected the plant will resume operations at an early date.

The Andrew Warren Railway Supply Co. is the name of a new company organized at St. Louis with a capital of \$25,000 to deal in railroad supplies. The directors are Moses Rumsey, F. A. Warren and Andrew Warren, of St. Louis.

The Long Island road and the New York & Putnam Division of the New York Central are to do a good deal of fencing this year, but just how much each company will do is not yet definitely decided.

Messrs. W. W. Crehore and Frank Miller announce that they have formed the "Structural Engineering Company" with offices at 39 Cortlandt street, New York City. The plan of the firm is not to take contracts, as that term is generally used, but to furnish engineering service only, more especially such as is required in the design, inspection and erection of buildings. They propose to prepare specifications for iron and steel struct-

ures, to make general plans and detail drawings, to supervise and inspect the work in the mills and during erection, and to furnish any other engineering assistance required. Both gentlemen have had considerable experience in this line.

The Acme Machine Co., of Cleveland, O., has been working a full force 12 hours a day for several months past, and still continues very busy. The company has received a number of orders from foreign countries, as well as from the United States.

The Champion Iron Co., of Kenton, O., has contracted to furnish all of the ornamental iron work used in the new Spitzer Building, in Toledo, O., one of the largest buildings in the city.

The Forest City Car Manufacturing Co. will soon start up its new plant at Forest City, Pa., on the construction of mine cars. The machinery is now nearly all in position.

The Pittsburgh Locomotive Works are now quite busy building new engines and on repair work. The shops have an order from the Pittsburgh & Lake Erie for ten 10-wheel freight engines with 18 in. x 24 in. cylinders, which will be larger than any now used by that company. Recently a number of 10-wheel freight engines have been completed for the Lake Shore, and three passenger engines and three switching engines for the Cincinnati, Hamilton & Dayton. A number of freight engines have been rebuilt for the Wheeling & Lake Erie, the Pittsburgh & Western and other roads.

The New York & Boston Railroad Construction Co. has been incorporated in Iowa, with a very broad charter, authorizing it to build railroads, water-works and much else, and to buy and sell bonds and stocks. The incorporators are Charles R. Mitchell, Charles T. Gregory and George Bell. The officers are Charles Andress, 108 Fulton street, New York, President; Charles T. Gregory, 136 Fulton street, New York, Vice-President; and Charles R. Mitchell, 108 Fulton street, New York, Secretary. The officers decline to give any information as to the company's affairs, further than to say that it has plans to purchase two Western roads, one being in Ohio.

The Pratt & Letchworth Co., of Buffalo, has been reorganized, and last week filed new articles of incorporation in New York. The capital stock of the new company is \$300,000, and it will continue the manufacture of steel castings and malleable iron products. The directors are Josiah Letchworth, Ogden P. Letchworth, Robt. Fryer and Franklin D. Locke, of Buffalo.

The organization of the Rogers Iron Works at Oakland Me., was noted in this column last week. This company takes over the business of George V. Rogers, who has been established at Oakland for many years. It will continue to manufacture the Pease planers, about thirty different varieties of boring machines and lathes, and a line of general tools for machine shop equipment. One department will be engaged in making a new ball bearing for use on bicycles, carriages, shaftings, etc.

The Jerome Metallic Packing Co., of Chicago, has been busy for some time past on important orders. Among more recent contracts have been orders from the Baldwin Locomotive Works for the packing for 10 locomotives building for the Kansas City, Pittsburgh & Gulf, and for the packing for three locomotives building by the Schenectady Locomotive Works for the Chicago, St. Paul, Minneapolis & Omaha.

The Prentiss Tool and Supply Co., 115 Liberty street, New York, which has been dealing in machine tools for many years, calls attention to the large variety of second-hand tools which it has in stock at present. The list includes lathes of many sizes made by the Pratt & Whitney Co., Pond Engine Co., and Bement, Miles & Co.; radial drills, slotters, wheel borers, wheel grinders and boring and turning mills, all the output of the most reputable makers.

The Springfield Construction Company has been organized at Springfield, Mass., to build iron and steel bridges, buildings and roofs. The company has purchased land at Indian Orchard, in the Eighth Ward of Springfield, and will erect buildings there. The principal stockholders in the company are T. J. Calnen, J. D. Reed and G. S. Groesbeck, all of whom have worked for R. F. Hawkins. The company has recently received an order for a steel building to be built at New Haven for Pratt & Lawton.

New Stations and Shops.

A renewed effort to secure the erection of a new union station at Galveston, Tex., is being made, and last week an ordinance granting the Gulf, Colorado & Santa Fe the right to close a city street was introduced in the City Council. It is thought that this ordinance will be passed and the company will then complete its plans for a new station. The cost of the new structure to be erected is variously estimated at over \$10,000. The ordinance before the City Council provides that the structure shall cost at least \$50,000. The site selected is within two blocks of the present station. The proposal to build the station which originated with the officers of the Gulf, Colorado & Santa Fe, had been practically abandoned because the railroad declined to pay the price asked for the land. The Chamber of Commerce of Galveston, however, subscribed about \$3,000, the amount of the difference in the negotiations, to secure the site, and the building will now be erected.

The new shops of the Atchison, Topeka & Santa Fe at La Junta, Col., east of Pueblo, are now about completed, and the new machinery is being put in place under the

direction of George W. Smith, Master Mechanic of the Topeka shops. The shops of course are small, but are unusually well built, and have a good modern equipment of tools.

The newspaper report that the St. Louis Car Co., and the American Car Co., large manufacturers of street cars with plants at St. Louis, had decided to erect an eastern plant on the Delaware River at Philadelphia is premature. The facts seem to be that the directors of both companies have discussed the advisability of erecting such a plant in the East, and that committees from both boards have spent considerable time looking over various sites. They have examined locations at Newark, Elizabethport, Wilmington, Del., at Bridesburg (Philadelphia) and other places, but no decision in favor of any particular site has as yet been arrived at. It is not even certain that an Eastern plant will be erected, although it has been about decided to build such shops. If a site is chosen in the East it is probable that the shops at the Peckham Motor Truck & Wheel Co., now at Kingston, N. Y., will be removed from that place to a site adjacent to the new car shops.

The Seaboard Air Line has begun the erection of a new car shop 250 ft. long at Portsmouth, Va., which will be ready for operation about March 1. The shop, besides doing the general repairs, will be equipped for building new freight cars, and it is said that the first work to be done will be the building of a large number of 60,000-lb. box cars.

The Cleveland, Cincinnati, Chicago & St. Louis will construct a roundhouse, water tank and coal and sand sheds on the Lake Shore northeast of the Union Station in Cleveland. The roundhouse will be of brick about 72 ft. x 120 ft., costing about \$7,500. The total cost of the buildings and sheds will be about \$13,000.

The Norfolk & Western is to rebuild its general office building at Norfolk, Va., which was burned by fire a few days ago. The plans for the new building are being prepared by George T. Pearson, of Philadelphia.

Iron and Steel.

The Virginia Bridge Works at Roanoke, which have been idle for many months, have resumed operations.

An important decision was handed down by the Supreme Court at Philadelphia recently in the case of James Todd and Frank Slocum against C. Y. Wheeler and the Sterling Steel Company. Mr. Todd claimed to own the process by which all projectiles manufactured by the Sterling Steel Company were made, and sued the company for royalties amounting to from \$20,000 to \$30,000. The company admitted their liability to account for all "Sterling double special" steel, in the development of which Messrs. Todd and Slocum had assisted as chemists, but denied liability for royalties upon projectile and other steel. The lower court decided the case in favor of the plaintiffs. The decision of the Supreme Court reverses this decision and requires the Sterling Steel Company to account only for the "Sterling double special" tool steel.

The annual meeting of the Warwick Iron Company, of Pottstown, Pa., was held Jan. 9 at the office of the company and the following Board of Directors was elected: Peter Schemm, Jacob Reech, C. H. Berlinger, Philip Doerr, Jr., Peter A. Schemm, Vincent P. McCully, E. S. Cook.

Directors of the Lackawanna Iron & Steel Company held a meeting in Scranton, Pa., on Jan. 9, at which it was decided to increase the bonded indebtedness of the company from \$1,200,000 to \$3,000,000. The increase was made, it is said, for the purpose of providing funds to pay the mortgage nearly due on the company's recently acquired Lebanon furnaces and steel mills.

The Tennessee Coal, Iron and Railroad Company, on Jan. 9, notified its 5,000 coal miners that their wages would be reduced five cents per ton. This is in accordance with the sliding wage scale contract in force between the men and their employers. The wages paid the miners depends upon the price of iron per ton. Several of the other companies have likewise effected a reduction.

The Roane Iron Company's mill, Chattanooga, Tenn., has been sold by the Southern Iron and Steel Co. to Thomas Carlin's Sons, of Allegheny, Pa. It is their intention to remove the plant, which fact has caused the people of Chattanooga to seriously consider the question of buying the mill, so as to keep the industry at that place. The works are large and well equipped with modern machinery, and their successful operation in Chattanooga would undoubtedly be an advantage to the city.

Press reports say that a meeting of iron ore interests was held Jan. 10, at Cleveland. The purpose of the meeting was to effect with the Bessemer ore producers of the Mesaba range an arrangement whereby the output of high-grade iron ores for the season of 1896 would be restricted and apportioned among the various producers.

Great Northern Railway Division Terminals.

The new division terminals recently constructed at Sandstone and Melrose, Minn., will equalize the length of freight runs, and effect a considerable saving in train crew service. The old runs were from St. Paul to Hinckley, 103 miles, and from Hinckley to West Superior, 68 miles; St. Paul to St. Cloud, 74 miles, and St. Cloud to Barnesville, 143 miles; Willmar to St. Cloud, 58 miles, and St. Cloud to Hinckley, 76 miles. With the new division points the freight runs are: St. Paul to Sandstone, 118 miles; Sandstone to West Superior, 59 miles

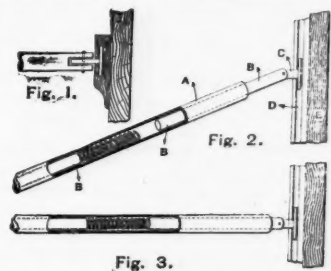
(double); St. Paul to Melrose, 108 miles; Melrose to Barnesville, 108 miles; Willmar to Sandstone, 132 miles. On the Montana Central line the division point is being removed from Helena to Clancy, at the foot of the mountain grade, making a run of 114 miles from Great Falls to Clancy, in place of 98 miles from Helena to Great Falls, and 58 miles from Clancy to Butte, in place of 73 miles from Helena to Butte.

The division points at Sandstone and Melrose are very similar; each includes a 20 stall roundhouse, a cinder pit, water tank, oil house, blacksmith shop, 20-pocket coal chute, etc. The buildings at Melrose are of brick. The roundhouse, boiler house and oil house at Sandstone are built of Kettle River Sandstone, quarried within a half mile, of a light pink color, fine grained and even in texture, and the buildings look very well although very plain. At Sandstone and Melrose coaling stations were built last year, which have a low storage bin of 500 or 600 tons capacity and a 20-pocket coal chute which is fed by a chain, scraping coal up an inclined trough from the bin.

Interlocking.

A large interlocking plant is to be erected at State Line, near Hammond, Ind., to provide signaling for the crossing of the Hammond & Blue Island Railroad with the New York, Chicago & St. Louis, the Louisville, New Albany & Chicago, the Chicago & Calumet Terminal, the Wabash and the Chicago & Western Indiana. The main track of the latter is used by the Erie from this point to Chicago.

The "Perfect" Self-Adjustable Curtain Fixture. The Brussels Tapestry Co., of Chauncey, N. Y., is making a curtain rod for railroad cars and for similar uses which seems to be well adapted to the purpose. The design of the fixture is shown in the accompanying illustration. It consists of an outside tube A, which is sewed in the bottom of the curtain leather; two rods B slide inside the ends of the tube A, having pivoted at their outer ends guides C, which slide in a groove in the casing stop E. The inside ends of the rods B bear against the springs S, which are so arranged as to press the



guides C against the casing with sufficient force to assist the roller to hold the curtain at any desired height and also to prevent rattling. The force required to do this is slight and the tension of the spring roller at the top keeps the curtain in position. The parts are all of metal and if properly adjusted will not, the makers claim, get out of order or need attention. The absence of intricate parts makes the operation of the curtain especially easy. The slides, being confined in the groove, cannot get out of place; thus the curtain does not swing or blow about in the wind.

Armor Plate Tests.

A plate representing 415 tons of 8-in. turret and battle armor for the battleship Iowa and the armored cruiser Brooklyn was tested at the Indian Head Proving Grounds on Jan. 8, with results unsatisfactory to the manufacturers, the Carnegie Steel Company. Two ports were cut in the plate to make it represent as nearly as possible the port-plate of a turret. A 6-in. armor-piercing projectile of the Wheeler type, weighing 100 lbs., was fired at the plate with a velocity of 1,700 ft. a second. The plate broke into three pieces. A second shot was fired at one of the pieces, which also failed to meet requirements.

New York State Canals.

The work of making the surveys for the Erie Canal improvements was begun Jan. 13. The plan is to divide the canal into 11 sections with an assistant engineer in charge of each section. Each engineer will have a force of 10 to 12 men, not including three or four laborers. Mr. J. L. Little, Division Engineer, is quoted by the daily papers as follows: "The first work on the improvement of the canals under the new law will probably be done in Buffalo. Buffalo is a feeder for 60 miles of canal and it is necessary to get water here before anywhere else. The depth of water here is the keynote for the whole canal system. The scheme of the State Engineer is to first start at Buffalo and deepen the channel in the canal about three feet to Tonawanda Creek."

Half a Dozen Coal-Car Tippers.

The Brown Hoisting & Conveying Machine Co. has just closed a contract with the Columbus, Sandusky & Hocking Railroad for one of its rapid coal handling plants to be erected at Sandusky. A Cleveland paper states that this makes six of these plants now in the course of construction, the machines for which are to be hurried forward so as to have them completed and ready for use at the opening of navigation. The other orders are: The Columbus, Hocking Valley & Toledo, at Toledo; the Toledo & Ohio Central, at Toledo; the Youghiogheny River Coal Co. and James W. Ellsworth & Co., on the L. S. & M. S. dock at Ashtabula; the New York & Cleveland Gas Coal Co. and the Ohio & Pennsylvania Coal Co.,

on the Cleveland & Pittsburg dock at Cleveland; the Huron Dock Co., on the docks of the Wheeling & Lake Erie Railroad at Huron.

A Steel Works for Australia.

Press reports say that a project for the establishment of extensive steel works in New South Wales, Australia, is being actively pushed in that country and in Great Britain. According to the plans, the works will be erected on navigable water about 60 miles from Sydney, where there is an abundant supply of suitable coal, and where iron ores can be procured within reasonable distance. The Government of New South Wales is reported to have offered very favorable inducements to the parties who have the enterprise in hand.

Lake Superior Iron Ore.

The production of iron ore in the Lake Superior districts during the past decade is tabulated as follows:

	Tons.
1886.....	3,559,371
1887.....	4,742,276
1888.....	5,046,503
1889.....	7,392,616
1890.....	9,003,701
1891.....	7,057,073
1892.....	9,072,241
1893.....	6,065,705
1894.....	7,755,994
1895.....	10,223,910
Total.....	69,859,315

Among the districts contributing to the large yield of 1895 the Mesaba range takes the lead with an approximate output of 2,750,000 tons, which is the largest amount ever forwarded except in 1890, when the Marquette range forwarded about 3,000,000 tons. The Gogebic is second this year with a product of 2,500,000 tons. The Marquette range produced 2,100,000, the Menominee 1,990,000, and the Vermilion 1,100,000 tons. Of the individual mines the Norrie mine is still in the lead as the largest ore producer in the world, with an output of nearly 900,000 tons for the past year. The Chapin mine is second, with 625,000 tons to its credit. The Chandler mine of the Vermilion range is a close third, having shipped about 610,000. The Cleveland Cliffs of Ishpeming and the Lone Jack Oliver mines of the Mesaba have each shipped over half a million tons. Some of the other large producers are the Minnesota mines 450,000 tons, Tilden, 400,000; Lake Angeline, 325,000; Lake Superior, 325,000; Penn Iron Company, 300,000; Pewabic, 250,000, and the Canton and Auburn mines about 365,000 tons each.

A Step Forward in Municipal Engineering.

The Water Purveyor of New York, Mr. E. P. North, and his colleagues, Messrs. Birdsall, Loomis and Towle, have for some time been trying to get a new classification, namely, Engineer-Inspectors, to the Civil Service Board. This is now successful and the examination is set down for Monday, Jan. 20.

It is hoped to open a school in municipal engineering for young men who wish to follow that branch of the profession, as these Engineer-Inspectors will be available in the various works under the Public Works Department, for street opening and grading, through sewer and water-pipe laying, to the finished pavement.

Common Roads in Massachusetts.

The Highway Commission of the state of Massachusetts has just sent in its third annual report. It will be remembered that this Commission was organized under an act passed about three years ago for the purpose of helping towns and other local governments to build and maintain good roads, and the theory on which it has worked has been to scatter its work all over the state in order to multiply object lessons. The Commission can make contracts either directly with the authorities of the city or town or with private contractors. All of the 1894 contracts were made with municipal authorities. In 1895 five contracts were made with private parties for work which cities and towns declined to undertake. The bridges on the common roads have been found in most cases to be in an unsatisfactory condition. In certain instances they have been replaced by stone arches, but more often by iron or steel bridges, carrying the macadam over the bridge. The Commission spent from July 1, 1894, to Dec. 31, 1895, a total of \$636,502 out of a total appropriation of \$700,000.

Continuous Brakes in India.

According to the latest official returns, 23.36 of the engines and 5.79 of the coaching stock of the standard gauge lines of India were fitted with the vacuum automatic brake, the numbers being: Engines, 618 fitted, 2,068 not fitted; coaching vehicles, 2,659 fully fitted, 598 pipes only, 52,962 not fitted. Of the train mileage run, 14.17 per cent. was made with braked trains. On the meter gauge lines much less progress has been made, and only 2.12 per cent. of the engines and 0.48 per cent. of the coaching stock were fitted; the numbers being 27 engines (20 on the South Indian and 7 on the Eastern Bengal) fitted, and 1,249 (3 are fitted with the Westinghouse brake) not fitted; coaching vehicles, 128 fully fitted, 23 with pipes only, and 31,155 not fitted. Only 0.27 per cent. of the train miles were run with braked or partially braked trains.

French Express Trains.

Mr. R. Varennes has given a short account to the French Soc. C. E. of his studies on the speed of express trains in France. The profiles of the six French express routes differ very little from the point of view of difficulties to be overcome, and, if account be taken of the time lost in stopping and starting, a fair basis of comparison of the average running speed between stops is obtained. From 1854 to 1876 the speed was alike on all the lines. In the latter

year the Orleans Co. put on a fast train from Paris to Bordeaux, making 45 miles an hour; no increase in speed since. Following this example the other companies gradually increased their speeds until in 1889 the Northern Railroad took the lead. In 1895 the following classification is made: (1) Northern, 53.125 miles an hour; (2) Eastern, Southern, P., L. & M. and P. O. railroads, 45 miles an hour; (3) Western, 42 miles an hour.

Oil Fuel on Ironclads.

Some time ago the German naval authorities began to experiment with residuum oil as fuel for men-of-war. The oil called "mazout" or goudron is stored on board ship in well-protected tanks and is injected by steam in the ordinary manner. The first experiments were made on the Carola, an artillery cadet ship; then two torpedo boats were fitted for oil fuel, and next the ironclads Weissenburg and Siegfried. It is said that greater rapidity in producing high pressure steam gives an increase of 20 per cent. in the speed of the boats. If the experiments now being made on the Siegfried warrant it, the ironclad Aegir, now under construction, will be originally fitted out for residuum oil.—*Revue Industrielle*.

■The (British) *Naval and Military Record* of Dec. 19 reports that during the mobilization of torpedo boat destroyers, it is intended to make experiments with oil in the Daring to test its efficiency as a fuel for ships.

The Goubet Submarine Boat.

The new submarine boat, Goubet, is spindle-shaped and measures 26 ft. in length and about 5 ft. 6 in. in diameter in the middle, with a capacity of 10 tons. It is cast in three sections of gun metal, which are bolted together. The middle section is surmounted by a dome, also of gun metal, about 1 ft. high, by which access is obtained to the interior. The hull is about 1 in. thick in the middle, and about one-third of this only towards the ends, but this gives sufficient resistance to navigate at any depth in the English Channel. The boat is propelled by a screw, which also serves the purpose of a rudder, the shaft being jointed to enable of its being moved right or left. The horse power is extremely small (one or two), this, it is said, being sufficient under water, where there is no wave-making, to give a speed of seven or eight knots. The motive power is electricity. The boat may be rowed backward or forward by a pair of fin-like arrangements to the fore. When the boat is in harbor the dome emerges. When this is closed water is let into compartments in the lower part of the boat, and it gradually sinks. The quantity of water admitted is regulated by very ingenious automatic apparatus, and when the Goubet is sunk to any required depth, at that depth it remains, the screw propelling it in a horizontal plane.—*The Practical Engineer*.

Broken Tires in England.

Of the 364 tires which failed on our railways during the nine months ending September 30 last, 15 were engine tires, 6 were tender tires, 3 were coach tires, 13 were van tires, and 327 were wagon tires; of the wagons, 249 belonged to owners other than the railway companies; 212 tires were made of iron and 152 of steel; 10 of the tires were fastened to the wheel by Gibson's patent method; 9 by Mansell's patent method, two of which left their wheels when they failed; 2 by Beattie's patent method; 269 by bolts or rivets, one of which left the wheel when it failed; 72 by other methods, one of which left the wheel when it failed; and in two cases the method of fastening was not stated; 38 tires broke at rivet holes, 128 in the solid, and 198 split longitudinally or bulged.—*The Engineer*.

Pneumatic Guns for San Francisco.

The fortifications of San Francisco have just been strengthened through the acceptance by the Government of three powerful pneumatic guns, each of which, when tested, threw 100 lbs. of high explosive upward of 5,000 yds. with precision. With 500 lbs. of gelatine a range of 2,100 yds. was secured; explosions occurred both on impact with the water and with a time fuse. Great accuracy of aim was secured. These three guns are similar to those which are now mounted at Sandy Hook, but are somewhat improved, as shown by the tests.

THE SCRAP HEAP.

Notes.

One of the transfer boats of the Ann Arbor road lost off seven loaded cars in the middle of Lake Michigan in a heavy sea one day last week.

James Brown, on trial at Ligonier, Ind., for participating in the train robbery at Kessler in 1893, pleaded guilty on Jan. 9, and was sentenced to 12 years' imprisonment.

The passenger conductors and brakemen of the Cleveland, Cincinnati, Chicago & St. Louis now run through between Cincinnati and Chicago, 306 miles; Cleveland and Indianapolis, 283 miles; Indianapolis and St. Louis, 265 miles, and on various other long runs.

The Brooklyn Heights Electric Street Railroad, of Brooklyn, N. Y., has just received two palace cars from the Barney & Smith Manufacturing Company, of Dayton, O. It is expected that they will be engaged for special trips by theater parties and other excursions, and an officer of the road states that the conductors will be true Chesterfields.

Within one week this month three costly coal breakers were burned near Wilkes-Barre, Pa., the last one being the Lookout breaker at Wyoming, valued at \$30,000. The other two, at Cranberry and Park Place, respectively, are reported to have been worth even more than this one. About 2,000 men and boys are temporarily thrown out of work.

On Jan. 11 the disturbances concerning the pipe-line crossing at Washington, N. J., were renewed, the at-

tempt of the railroad company to tear up the pipes being resisted by 100 men. It appears that the recent decision of the court has not settled matters, and the proceedings noted above were photographed by the railroad officers with a view to further litigation.

The bridge of the Louisville & Nashville over an arm of the Gulf of Mexico at Rigolet's, La., was wrecked on Jan. 6 by the derailment of a freight train, two spans carried away. It does not appear whether the draw was open or the train was derailed from some other cause, but the engine and 22 cars went down.

John McGranahan, of East St. Louis, has sued the Cleveland, Cincinnati, Chicago & St. Louis for changing, without his knowledge, the route of a train on which he rode; and the jury has awarded him \$300. He bought a ticket from Buffalo to St. Louis, expecting to get off at East St. Louis, but the train went around that town so as to cross the river over the Merchants' Bridge and the passenger had to pay his fare back to East St. Louis. The road will appeal.

The Board of Works of the city of Newark, N. J., has passed an ordinance prohibiting the street railroads of that city from carrying freight or doing an express business. The electric railroad companies have made extensive plans looking to the transportation of freight, and it is said that the Consolidated Traction Company already has a number of freight and express cars. An officer of one of the street lines has published a letter warning the city that in prohibiting the transportation of freight on street car tracks it is injuring its own interests, as several manufacturers now looking for sites for factories will come to Newark, if they can have track connections, and will stay away if they cannot.

A Chicago paper reports the number of persons killed on railroad tracks (other than street surface roads) in that city during the year 1895 as 274, including seven passengers, 55 employees and 212 other persons. There were six suicides. A list is given showing the number killed on each road in each month. When this subject was up some two or three years ago it appeared that the coroner's statistics included the whole of Cook County, but whether that is the case with the present report we are unable to determine. The coroner gives the number of cases, on each road in which the company was censured by the jury. The largest on any one road is six and the total is 49 or about one case out of six. There were 62 fatal accidents on the street railroads.

Another Steamer for the Plant Lines.

The contract for building another freight and passenger steamer for the Plant Line has been awarded to the Newport News Shipbuilding & Dry Dock Co. The vessel will cost about \$50,000. This makes nine vessels under contract to be built at Newport News, including the battleships.

A Subject for the Joint Traffic Managers.

As soon as E. O. McCormick, Passenger Traffic Manager of the Big Four, knew that the Republican National Convention was going to St. Louis, he secured an option on 1,000 rooms at different hotels there. As an extra inducement to the patrons of the Big Four, he has arranged to furnish them with rooms without payment of commission or premiums. Railroad men say that this is one of the greatest advertisements the Big Four ever had.—*Pittsburgh Post*.

Why cannot this be called rate-cutting, just as much as paying cartage or sending shippers telegrams D. H.?

Northwestern Logging Interests.

Foley Bros. & Guthrie, leading railroad contractors of Minnesota, have merged their business with a Stillwater logging firm, the capital put into the new firm being \$1,000,000, for the logging of 300 million feet of pine timber around Mille Lacs Lake in northern Minnesota. The firm will also operate a railroad 40 miles long. The pine is all to be cut in 15 years. It is likely that it largely exceeds the quantity stated above.

The Minnesota Logging Co., operating the Brainerd & Northern Minnesota Railroad, is now cutting about 1,000,000 feet of logs daily, a small part of which are banked in lakes for summer rail hauling, and the rest loaded on cars direct.

About 325 million feet of logs will be landed into the tributaries of the Mississippi during the winter. One concern, Musser, Sauntry & Co., will get out 75 million feet on the upper St. Croix River, and haul nearly all over the Eastern Minnesota Railroad to mills at Duluth. The total cut of the winter in the Duluth District is expected to be over 400 million feet, of which more than half will be hauled to mills by rail. The Duluth, Mississippi River & Northern will handle during the year about 150 million feet of logs, largely for the Pine Tree Lumber Co., of Little Falls. These operations, and a few small timber agreements for mills along railroads west of Red Lake Reservation, will complete the work in Minnesota for the year, amounting to not much less than 1,200 million feet.

Beneficial Effect of a Cheering Payroll.

About 450 employees of the Kings County Elevated Railroad, Brooklyn, N. Y., on Jan. 1 received an increase in their wages of 10 per cent., or a return to the scale in force prior to Oct. 1, 1893. According to the New York *Tribune*, the effect was noticed all along the line. The trainmen mostly said "Elm and Duffield!" when they reached the drygoods district, instead of "Elumduff!" and the gates were shut more gently than usual.

Railroad Disaster in South Africa.

A press despatch from Cape Town, Jan. 6, says that on Dec. 31 a passenger train was derailed between Johannesburg and Durban, South Africa, and 28 passengers killed.

The Lake Erie & Pittsburgh Canal.

The committee which is promoting the Lake Erie & Ohio River ship canal project has secured the consent of the following to be a n ed as incorporators in the charter for the canal. The necessary bills were introduced in Congress this week: Andrew Carnegie, George A. Kelly, Charles W. Batchelor, John B. Jackson, B. F. Jones, Thomas P. Roberts, John E. Shaw, W. S. Shallenburger, C. L. Magee, William Flinn, William M. Kennedy, Hon. Morrison Foster, W. L. Scaffe, W. Harry Brown, D. E. Park, John A. Wood, Eugene M. O'Neill, James F.

Hudson, H. J. Heinz, James G. Butler, Jr., Youngstown, O.; Simon Perkins, of Sharon; S. S. Marvin, D. P. Black, J. R. Harrah, Beaver; George H. Anderson, William P. Herbert, A. J. Logan and Ex-Governor A. B. Fleming, of West Virginia.

A committee of engineers, including Gen. Abbott, of the United States Army (retired), and Prof. L. M. Haupt, has recently gone over the route of the canal, making a general examination of its engineering features, but its report has not yet been made public, though promised for early publication.

Receiverships and Foreclosures in 1895.

RECEIVERS APPOINTED.

Road.	Miles.	Funded Debt.	Capital Stock.
Manhattan, Alma & Burlington	126	\$ 657,000	\$ 1,000,000
Wichita & Western (A., T. & S. F.)	55	1,750,000	1,135,000
Norfolk & Western	1,574	55,000,000	59,500,000
Delaware River & Lancaster	12	310,000	214,000
Atlantic Short Line (Ga.)	38	400,000	400,000
Pittsburgh, Marion & Chicago	25	896,000	500,000
Ohio Southern	224	5,463,000	3,840,000
Pensacola & Perdido	10	60,000	125,000
B. & O. Zanesville & C. (N. G.)	111	988,000	1,600,000
Columbus, Sandusky & Hook	227	9,127,000	7,385,000
Mobile & Spring Hill	7	100,000	100,000
San Antonio & Gulf	29	311,000	311,000
New Orleans & Southern	66	1,174,000	200,000
Mammoth Cave	8	100,000	100,000
Humeston & Sherard	112	2,618,000	4,026,000
Columbus Southern	88	1,087,000	1,305,000
St. Louis & Arkansas River	34	375,000	500,000
St. Joseph & Grand Island	251	11,390,000	4,670,000
Indiana Bluff & Eastern (N. G.)	23	180,000	600,000
Port Townsend Southern	43	3,000,000	3,000,000
Columbia & Puget Sound (N. G.)	54	1,000,000	1,000,000
Pacific Coast (N. G.)	77	1,370,000	1,370,000
Seattle & Northern	36	5,000,000	5,000,000
Kansas City & Omaha	194	2,713,000	4,408,000
Tennessee Central	12	130,000	100,000
Ft. Wayne, Terre Haute & S. W.	11	100,000	100,000
Pennsylvania	18	200,000	300,000
Pennsylvania Midland	10	200,000	200,000
New York, Pennsylvania & Ohio	690	124,777,000	45,000,000
Chicago, Indiana & Eastern	10	100,000	100,000
Whippany River	4	25,000	25,000
Total, 31 roads.	4,08	\$221,211,000	\$147,858,000
Total bonds and stocks.			\$169,069,000

* Estimated.

ROADS SOLD UNDER FORECLOSURE.

Road.	Miles.	Funded Debt.	Capital Stock.
Lake Erie, Alliance & Southern	36	\$2,085,000	\$3,000,000
Asheville & Spartanburg	66	715,000	1,050,000
Western New York & Pa.	633	30,000,000	20,000,000
Charleston, Sumter & Northern	150	2,285,000	1,328,000
Chattanooga Southern	92	1,440,000	1,440,000
Georgia Southern & Florida	285	3,420,000	3,420,000
Northeastern (Ga.)	39	575,000	239,000
Toledo, Ann Arbor & N. Mich.	298	7,485,000	6,500,000
Mobile & Birmingham	147	4,500,000	3,000,000
Florida, Georgia & Western	11	100,000	100,000
Mary Lee Coal & Railway	1	184,000	500,000
Savannah, Americus & Montg.	300	3,690,000	1,640,000
Frankfort & Southeastern	28	234,000	234,000
Northern Adirondack	57	497,000	840,000
Santa Fe Southern (N. G.)	36	840,000	1,115,000
Atlanta & Florida	10	840,000	1,115,000
Bristol, Elizabethton & N. C.	28	150,000	600,000
Texas, Louisiana & Eastern	30	150,000	500,000
Chattanooga Union	45	750,000	1,000,000
Brigantine Beach	15	550,000	355,000
New York & New England	360	17,215,000	23,817,000
Harriman Coal & Iron Railroad	30	500,000	300,000
Ogden & Hot Springs	7	180,000	160,000
Rockaway Valley	25	200,000	200,000
Texas Western (N. G.)	52	900,000	900,000
Texas Trunk	52	1,000,000	750,000
Southern Central	115	3,866,000	1,775,000
Middleborough Belt	21	552,000	1,000,000
Knex., Cumberland Gap & Louisv	8	2,150,000	2,975,000
Waco & Northwestern	18	200,000	1,500,000
Jacksonville, Mayport & Pablo	28	75,000	200,000
Valley (O.)	88	3,124,000	1,241,000
Columbus, Sandusky & Hook	227	9,127,000	7,385,000
Birmingham, Sheffield & T. Ry.	119	2,975,000	3,275,000
Chicago, Peoria & St. Louis	122	2,938,000	3,500,000
Central R. R. of Georgia	311	14,000,000	7,500,000
Savannah & Western	482	11,000,000	3,000,000
Tennessee Midland	136	2,711,000	3,390,000
Paducah, Tennessee & Alabama	11	2,432,000	2,432,000
Nevada Southern	31	450,000	600,000
Washington City & Pt. Lookout	12	540,000	1,000,000
Carolina, Cumberland Gap & Chi.	24	925,000	500,000
Savannah & Atlantic	18	250,000	250,000
New York, Lake Erie & Western	551	77,644,000	86,374,000
Marietta & North Georgia	239	2,384,000	3,385,000
Mobile & Girard	12	1,590,000	1,269,000
Port Royal & Western Car. L. ne.	227	2,500,000	1,418,000
Montgomery & Eufaula	80	1,500,000	620,000
Atchison, Topeka & Santa Fe	6,543	102,000,000	232,575,000
Cincinnati & Kentucky Southern	13	250,000	250,000
Macon & Birmingham	97	1,940,000	1,940,000
Florida Midland	41	352,000	352,000
Total, 52 roads.	12,831	\$326,231,000	\$435,560,000
Total bonds and stock.			\$761,791,000

In respect to foreclosure sales the record is extraordinary. In only two years in the last twenty—1879 and 1877—has the number of roads sold been as large, while in mileage and capital involved the figures for 1895 are far greater than for any other year in the history of the country.—*Railway Age*.

Railroad Land Grants.

The Secretary of the Interior has approved the following grants of lands to railroads: To the Northern Pacific, 53,558 acres in the Vancouver and Spokane Falls districts; Washington, 241,213 acres in the Lewistown, Mont., district; 23,383 acres in the Vancouver, Wash., district; 73,552 acres in Washington; 79,342 acres in the North Yakima and Walla Walla districts; Washington; 18,661 acres in the Spokane Falls district. To the Oregon & California Railroad, 21,813 acres in the Roseburg, Or., district. To the New Orleans Pacific Railroad Company, 1,619 acres in the New Orleans Natchitoches district, Louisiana.

Color-Blindness.

The following item, which has been extensively circulated for two or three months past, seems to have passed through the hands of several revisers, and we feel safe in assuring the reader that we are now giving the true 1896 version:

"L. E. & W. R. R., MONTMORENCI, Ind., Feb. 31.
"Inspector—Dear Sir: The day before yesterday at nine I got word to cum down and have me ise looked after for culur blindness. I had 45 tie and 10 rails to put down beyond the sand cut and my hands were

too short to spare me. The right iy that was first in my head was put out with the blow of a pik and me glass iy is a perfect figger of the iy that was not put out, & is sent to you and my watch for the examination. I could spare the glass oye better than the one in the head; if she is culur blind I'll get one that ain't".
"ANTHONY DRISCOLL."
Foreman, Sec. 18.

The Deep Waterway Commission.

James B. Angell, President of the University of Michigan; the Hon. John E. Russell, of Boston, and L. E. Cooley, of Chicago, the American members of the International Deep Waterways Commission, met at Detroit on Jan. 13 and the Canadian Commissioners were to meet with the American Commissioners later in the week. The Commissioners will discuss the deepening of the Welland Canal and the St. Lawrence Canals and other projects for a deep waterway from the Lakes to the Atlantic.

Some Receivership Expenses.

Judge Caldwell has filed an order in his court at Topeka, allowing certain legal and other fees in connection with the receivership of the Atchison, Topeka & Santa Fe. Some of the larger items are given below. To the Union Trust Co., of New York, as trustees, \$50,000; to J. B. Johnson, as special master, \$15,000. In addition to this amount Judge Johnson has been receiving a salary of \$750 a month, the total sum received by him being \$83,000. To Wheeler H. Peckham, counsel to the complainant, for compensation in addition to what he has received, \$55,000. To Rosingham, Smith & Dallas, as solicitors for complainant, in addition to what they have received, \$27,000. To Mercantile Trust Co., as compensation for services, \$10,000. To Alexander & Green, counsel for Mercantile Trust Co., \$10,000. To each of the receivers, Aldace F. Walker and John J. McCook, and to the heirs of the deceased Receiver, Joseph C. Wilson, at the rate of \$25,000 per annum. To George R. Peck, counsel for Receivers, in addition to what he has received, \$45,000. To E. Kenna, counsel for Receivers, \$15,000.

A Technical Club in Chicago.

At an informal meeting of several gentlemen in Chicago, Nov. 14, it was proposed to form a social Technical Club somewhat on the same lines as the Engineers' Club of New York, the membership to be composed of engineers, architects, railroad officials and representatives of allied interests. It is proposed to provide all of the usual accommodations of a club, including a restaurant and rather large number of sleeping rooms; and to maintain them in a thoroughly comfortable and serviceable manner on a low basis of dues. We know no reason why such a club should not be as successful in Chicago as the Engineers' Club has been in New York. The latter now has 655 members of whom 355 are non-residents. It has a handsome cash surplus, and indeed has always been financially prosperous. It maintains a comfortable club house, with a good kitchen and all the conveniences of a thoroughly appointed club. It is much used and has become a favorite headquarters of engineers and of those allied by business interests with engineers. The great secret of its success has been the care taken by its managers to keep the club expenditures within its income. It has been remarkably fortunate in always having a governing board made up of men of liberal ideas combined with sound business sense. We freely give the Chicago men this pointer.

LOCOMOTIVE BUILDING.

The Lake Erie & Western has recently ordered six mogul engines from the Brooks Locomotive Works. The engines are to be delivered in May.

CAR BUILDING.

The Madison Car Co., of Madison, reports that it has built 2,200 cars during the last six months.

The S. E. Barrett Mfg. Co. is in the market for 10 tank cars, 31 ft. long, with a capacity of 6,600 gals. or 60,000 lbs. These cars will be built for carrying coal tar. The office of the company is at 108 La Salle street, Chicago.

A full force of men is now employed in the works of the Wagner Palace Car Co., at East Buffalo. Fifteen new sleeping cars are being constructed, and also a private car for Dr. W. Caldwell, President of the Lake Shore road.

The Lake Erie & Western and Northern Ohio roads have let a contract for 60 cars, two complete trains of Rodgers' ballast unloading cars, which will be used in the rebalasting of the Northern Ohio. The cars will be delivered to the company in the spring.

The New York Equipment Company, of 80 Broadway, New York, has just closed contracts for a large amount of rolling stock, etc., to be used on the Chesapeake & Western, now building in Virginia. The orders include two passenger coaches, two combination cars, all equipped with six-wheel trucks; 20 box cars, 10 platform and 20 gondola cars, for prompt delivery. In addition to these orders the New York Equipment Company has also closed contracts, since the first of the year, with the Lancaster & Hamden road of Ohio, for two passenger coaches.

BRIDGE BUILDING.

Albany, N. Y.—Senator Ahearn on Jan. 9 introduced a bill incorporating the Ward's Island Bridge Company to construct a bridge for passenger and other traffic between the Twenty-third Ward of New York and Long Island City, via Ward's Island.

Bellaire, O.—The work of surveying the final locations for the new Bellaire & Benwood Bridge Company's bridge over the Ohio, which is to connect this city and Benwood, W. Va., was begun last week by A. J. Norton and a corps of engineers. The bridge will leave the West Virginia shore at Sixth street, in Benwood, and land directly opposite private property on this side. It will be a highway bridge, with tracks for the Wheeling and the Bellaire, Bridgeport & Martin's Ferry electric railroad companies, making for the two roads a continuous circuit of 12 miles of line, passing through seven towns.

Bridgeport, N. J.—The Board of Freeholders have ratified the contract with Cox & Sons Co. for building the New Broad Street Bridge over the Cohansey, and ordered the issuance of bonds for payment of the cost of construction.

Buffalo, N. Y.—We noted last week the opening of bids for erecting the abutments, piers and approaches for the new lift bridge over the Buffalo River at Mill street. The contract was awarded to Delaney & Mullen at \$48,000.

Campbellton, N. B.—The Restigouche & Bonaventure Bridge & Railroad Co. is applying for a charter to build a railroad and highway bridge across the Restigouche River, from Campbellton to Mission City.

Canton, O.—A bridge is to be built over Mimishillen Creek at East Ninth street, and bids for the stone abutments will be received until Jan. 25. Address L. Loichot, County Auditor.

Carthage, Mo.—Bids were opened on Jan. 13 for two steel bridges over the mill race, their spans being 28 and 36 ft. respectively.

Chicago, Ill.—Bids were opened Dec. 28 by W. D. Kent, Commissioner of Public Works, for building the foundations and substructure for the new bascule bridge at North Halsted street. The contract was awarded to Wilson & Jackson, 1539 Monadnock Building, Chicago, their bid being \$31,622.25.

Cincinnati, O.—Plans and specifications have been drawn up for a bridge on the Mt. Hope road, in Crosby County, crossing Dry Fork Creek. These specifications have been approved by the County Commissioners. The engineer is Frank Krug, of Cincinnati. Bids will be received until Jan. 25 by Henry Korb, Pres. Board County Commissioners, Hamilton Co.

Cleveland, O.—The Akron, Bedford & Cleveland Inter-urban Railway Co.'s bridge over Tinker's Creek failed on Jan. 9 while a motor car and loaded coal car were passing over it. Two men were killed and one seriously injured. Press reports say that the span, which was 175 ft. long, will be replaced with a temporary wooden structure and later with a steel structure, by the Wrought Iron Bridge Co., of Canton, O., which built the old bridge.

There is some talk of building a bridge at Willow street over the old bed of the river. The bridge if built would be about 300 ft. long and cost about \$140,000.

Confluence, Pa.—The bridge over the Youghiogheny at this point will not be built, owing to opposition.

Cumberland, Md.—There is a plan on foot here to get up a petition requesting the West Virginia & Pittsburgh to build a bridge over its tracks at Cumberland and Johnson streets.

Danville, Pa.—The council has decided on the following specifications for the new bridge across the canal at Wall street: Length between abutments, 150 ft.; width of roadway, 16 ft.; capacity, 100 lbs. to the square foot. Bids were opened Jan. 17.

Danville, Va.—Bids were received Jan. 6 for a 60-ft. bridge, with 18-ft. roadway, across Sandy Creek. The bid of the Virginia Bridge Company, Roanoke, \$775, was accepted.

Darien, Ga.—Bids will be received by W. S. McIntosh, Clerk of the Board of Commissioners, until Jan. 21, for building two bridges.

Denver, Col.—Last week we noted the receipt of bids for the bridges over the Gunnison and Grand Rivers. The State Engineer on Jan. 3 let the contract for the bridge over the Gunnison River near Gunnison, to the Kansas City Bridge Company, of Kansas City. It will be a steel bridge, with tubular piers, and will cost \$3,000. At the same time the contract for the new bridge over the Grand River in Mesa County, near Grand Junction, was let to the Wrought Iron Bridge Company, of Canton, O. It will be a steel bridge, and will cost \$7,170.

Des Moines, Ia.—It is reported that the Keokuk & Western is soon to build a new steel bridge over the Coon River between the Eighth and Ninth street bridges.

East Liverpool, O.—The bridge to be built across the Ohio at this place, the award of the contract for which we noted last week, will be 1,400 ft. in length, the channel span being 700 ft. It will be in four spans. The bridge is to connect the town of East Liverpool with the property of the Chester Land Co., which land is located on the West Virginia side of the river. This land is to be laid out into a city, with water, electric lights and an electric railroad. The land company will build a very large pottery near the river. The electrical railroad will connect with the Johnson road, of East Liverpool and Wellsville, and connecting those towns, and with Rock Springs, a well-known resort, three miles from the West Virginia end of the bridge. The directors of the new enterprise are: George P. Rust, of Cleveland; J. E. MacDonald, W. L. Smith, E. D. Marshall, E. A. Macall, and J. G. Kerry, of East Liverpool.

Elbow Lake, Minn.—Bids were opened on Jan. 11 for a bridge over Round Lake Creek, near Delaware.

Hartford, Conn.—Press reports say that the Commission having the Connecticut River bridge in charge has asked for plans for a new structure, refused to put a foot bridge across at present, and announced its intention to build another temporary bridge during the building of the permanent bridge next summer. If it is allowed to go ahead. The towns of the district continue to keep their suits in the courts, and apparently will not withdraw their opposition to the Commission. The prospects for a bridge under two years seem to be slight.

Hornellsville, N. Y.—Petitions are being generally signed requesting the Central New York & Western to remove the piling placed in the Canacadea Creek, and asking for an iron suspension bridge in its place. It is understood that the petition is to serve as a basis for legal proceedings if the request is not granted.

Houlton, Me.—The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the town of Houlton a new iron bridge 300 ft. long and 18 ft. wide, with one side walk 18 ft. wide. The Bridge Company furnished the entire bridge, sub-structure and superstructure complete.

Houston, Tex.—The Coletto bridge is completed and has been accepted by the commissioners. It is a 180-ft. steel span, with a 168-ft. steel trestle and was built by the Penn Bridge Company.

Jersey City, N. J.—Work was begun Jan. 8 upon the steel trestle which is to carry the trolley road between Jersey City and Newark over the Delaware, Lackawana & Western tracks at Sandford's crossing on the Newark and Jersey City turnpike. It is to be 900 ft. long and will have 21 ft. clear headroom. The cost is estimated at \$25,000, and the contract calls for completion by April 1.

Lockport, N. Y.—It is reported that the old Pine street bridge over the canal will have to be removed to make room for the lift lock which it is proposed to build at this place. The bridge has been considered unsafe for several years, and it will be a great advantage to the city to replace it by a new structure. It is proposed to

make the new bridge 64 ft. wide, which is the width of the street.

The materials for the street railroad bridge over the canal at Mill street have arrived and the work of erecting the bridge has been begun.

Milwaukee, Wis.—It is said that steps will be taken this year to build a new bridge at Huron street, to replace the present old structure. Estimates for a new bridge place its cost at about \$60,000.

Minneapolis, Minn.—The residents of Camden Place, in the suburbs of Minneapolis, are about to petition the City Council for a bridge over the river about half a mile above the present bridge at Twentieth street.

Murphy, N. C.—It is probable that the Marietta & North Georgia will soon build a bridge at this place across the Hiwassee River.

New Westminster, B. C.—The city council has again taken up the question of constructing a bridge over the Fraser River. The Provincial Government has made a grant of \$126,000, and the Dominion Government will be asked to grant \$100,000. D. Robson is City Clerk.

New York.—The new East River Bridge Commission has requested the War Department to allow them to build the bridge 135 ft. above the river, which is the height of the present bridge. The army engineer recommended 145 ft., which was afterward reduced to 140 ft. It is said that a reduction to 135 ft. will save \$1,000,000.

New York.—Mr. Bedell, of Orange, presented a bill at Albany recently in relation to the New York and New Jersey Bridge Company. It is practically the same measure introduced last year, but grants an extension of time for completion of the bridge, the essential feature being that this time is made ten years from the date of the approval of the plans by the Secretary of War.

Norfolk, Va.—A charter has been obtained, and a free bridge is to be built between Portsmouth and Pinner's Point, which is the deep water terminal of the Southern and the Norfolk & Carolina.

Philadelphia, Pa.—Press reports say that a new steel bridge will soon be built over Cape Island Creek, at Broadway.

Seranton, Pa.—The Select Council has passed the ordinance providing for the appropriation of \$150,000 for the viaduct over the D., L. & W. tracks on West Lackawanna avenue. The Common Council has passed the ordinance on second reading.

Seattle, Wash.—A petition has been sent to the Board of County Commissioners, asking for a bridge across the Cedar River.

Sioux City, Ia.—The Combination Bridge Co., has issued invitations to the opening of the new railroad and highway bridge over the Missouri River at this place, which opening will take place on Jan. 21. In the evening a banquet is to be given to the bridge company by the Sioux City Commercial Association at the Mondamin Hotel.

St. Anne de la Perade, Que.—The bridge across the St. Anne River at this place has been carried away.

St. Thomas, Ont.—A by-law to issue debentures for \$3,000 to build a bridge at Palm street, between the north and south sections of the city, was carried at the municipal elections.

Sauk Rapids, Minn.—There is some talk of rebuilding the bridge at this place over the Mississippi River, but nothing definite has as yet been done. It is also reported that the County Commissioners have begun work upon a new steel bridge over the dam.

Syracuse, N. Y.—The council met on Jan. 6, and a resolution was passed requesting the local members of the legislature to secure the passage of a bill authorizing the city to raise \$12,000 for a stone-arch bridge over the Onondaga Creek at Cortland avenue.

Washington, D. C.—A bill has been introduced in Congress by Congressman Terry to revive and re-enact the act authorizing the building of a railroad bridge at Little Rock, Ark.

Watron, N. Y.—M. L. Van Kirk has been authorized to draw plans for the new bridge over the Seneca outlet, just below the state dam. A double arched bridge is proposed.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

The Supreme Court of Tennessee holds that a company owning a railroad is not liable for injuries to an employee of a lessee of the road caused by defects in an engine owned and controlled by the lessee, merely because the lease was made without statutory authority.¹

In Idaho it is held that a railroad that has purchased and paid for a right of way across land is not liable for the expense of removing a building therefrom in the absence of an agreement to that effect.²

The Federal Court rules that where coal is supplied to a railroad, and used in its operation for the purpose of carrying on its business, both before and after the appointment of a receiver, such receiver should be directed to pay not only for that used by him, but for that supplied and used within six months before his appointment; and when there has been a diversion of income to payment of interest or for betterment, such coal should be paid for out of the corpus of the property, if the income is insufficient.³

In Pennsylvania it is ruled that the lessee of a railroad is not liable for injury to land caused by the overflow of a stream due to the lessor's improper construction of the road and a bridge thereon.⁴

The Federal Court rules that the Tennessee statute providing that no railroad shall create any lien on its property which shall be valid as against judgments "for timber furnish d and work and labor done on, or for damage to persons and property in the operation of, its railroad in this state," does not include material furnished and work done in the creditor's machine shops on locomotives; or railroad supplies, such as tools, spikes, hardware, etc.; or damages resulting from detention of freight shipped over the line, unless such damage was occasioned by an actual injury to the property, and unless the same occurred within the state.⁵

In the Supreme Court of the United States it is held that a county which has authority to sell its lands for money, may, in the absence of express restrictions, sell them for money's worth, as for a consideration consisting in the construction of a railroad through the county, and the building of wharves, docks, and depots for the accommodation of the public.⁶

In Minnesota the Supreme Court rules that in proceedings before the railroad and warehouse commission to regulate the rates of a common carrier, the commission,

and, on appeal, the court should be liberal in receiving evidence on the question of what is a reasonable rate, and may hear arguments in behalf of any person or corporation interested in the result.⁷

In Indiana the Supreme Court decides that a railroad is not liable for damage caused by water thrown back upon land, by the construction of its embankments, from depressions in the ground, in which water flows only when a neighboring river overflows its banks.⁸

In Pennsylvania an agreement for the purchase of a right of way provided that upon payment of the price the owner should give a deed to the railroad company, and also that the company should construct and maintain a crossing over the right of way. The Supreme Court holds that the owner had a right to incorporate into his deed to the company a covenant that the grantee should maintain a crossing for the grantor, his heirs and assigns.⁹

The Supreme Court of Indiana rules that an allegation that a railroad negligently caused malodorous freight to remain an unreasonable and unnecessary time in front of plaintiff's premises sufficiently shows abuse of right of common carrier, whether the action be for negligence or nuisance.¹⁰

The Supreme Court of Georgia decides that there being a general law for the incorporation of railroad companies, though the special charter of a railroad company be unconstitutional, it could hold property, and render itself liable to creditors by any act which would have bound it had it been incorporated under the general law.¹¹

In Texas it is held by the Court of Appeals that the station agent of a railroad may bind it by contract to furnish cars at his station for the shipment of freight, but not at other stations.¹²

In Arkansas it is held to be within the scope of the employment of a baggage master to receive more money for transportation as baggage than he is authorized to do by the rules of the company.¹³

Injuries to Passengers, Employees and Strangers.

The Court of Appeals of Texas rules that in an action for personal injuries a railroad will not be permitted to show it had furnished its passengers with a more expensive road and equipment than its business would justify.¹⁴

The Supreme Court of Kansas holds that a contract between a railroad and a shipper of live stock, providing that such shipper shall remain in the caboose while the train is moving, is reasonable, and not against public policy.¹⁵

In Texas it is held that in ejecting a passenger from a railroad train, employees of the company have no right to place the baggage of the passenger in a place where it will be injured.¹⁶

The Federal Court rules that statements of a ticket agent that a certain train stopped at a certain station will bind the railroad company only when made contemporaneously with the sale of a ticket, and not when made several weeks before, and not referred to at the time the ticket was sold.¹⁷

In Arkansas it is held that where a locomotive engineer, without fault on his part, first discovered a defect in the engine after he had commenced his trip, he was not bound to immediately abandon the same, if the defect was not apparently such as to render the engine immediately dangerous, if handled with great care, and if the risk was not greater than an ordinarily prudent person would have taken under the same circumstances.¹⁸

The Court of Appeals of Kentucky held that an employee, having knowledge of the defective condition of the lever on a hand car, and who thereafter continued to operate the car, was not entitled to recover for injuries received by reason of such defect.¹⁹

In Kansas the Supreme Court rules that, whether a brakeman who had been running for more than a year over a section of railroad on which there was a bridge sufficiently high to permit him, while standing on the top of ordinary freight cars, to pass in safety, but who was killed by striking the bridge while riding on a car much higher than the ordinary, was guilty of contributory negligence is a question for the jury.²⁰

In Indiana a car repairer, whose duty it was to make repairs marked by the superintendent, was killed while in the employ of defendant by the negligence of the superintendent in failing to discover and mark defects in a car which he directed decedent to repair. The Supreme Court rules the defendant was liable, the danger not being one of the assumed risks of the employment.²¹

In Kansas the Supreme Court holds that the maintenance of a bridge over a railroad track so low as to make it unsafe for brakemen is *prima facie* negligence.²²

The Supreme Court of Georgia rules that where, without the knowledge of the conductor or engineer, some person applied a brake to the car on a street railway while the engine and car were ascending a steep grade, and thus the progress of the engine was arrested, whereupon the conductor, in order to enable the engineer to go forward, had the brake taken off, and the engineer, not knowing that the brake would be taken off, and intending to go backward down the grade, reversed the engine at about the same moment the brake was taken off, and in consequence of this inharmonious action the train backed too rapidly, and collided with a wagon which was not known to be on the track until it was too late to stop, and which would not have been there but for the mules drawing it having become suddenly frightened by the movement of the train, the calamity was a pure accident, and the driver, who sustained a personal injury by the collision, cannot recover.²³

In Wisconsin in an action for an injury caused by being struck, while crossing defendant's track, by the rear section of a train, it appeared that when the first section passed defendant stood 15 ft. south of the track; that he could see down the track 260 ft.; that he started slowly across the track, and was struck by the rear section. The Supreme Court rules that plaintiff was guilty of contributory negligence.²⁴

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Brooklyn City, quarterly, 2½ per cent., payable Jan. 15.

Central Ohio, semi-annual, 3 per cent., payable Jan. 31.

Chicago, St. Paul, Minneapolis & Omaha, semi-annual, 3½ per cent., payable Feb. 20.

Cornwall & Lebanon, semi-annual, 2 per cent.

Long Island, quarterly, 1 per cent., payable Feb. 1.

Mine Hill & Schuylkill, \$1.75 per share, payable Jan. 15.

Pittsburgh, Cincinnati Chicago & St. Louis, 2 per cent., on the preferred stock, payable Jan. 27.

Toledo & Ohio Central, quarterly, 1¼ per cent., payable Jan. 25.

Granite, annual, 166 Devonshire street Boston, Mass., Jan. 20.

Jackson, Lansing & Saginaw, annual, office of Henry B. Ledyard, Michigan Central Station, Detroit, Mich., Jan. 24.

Lehigh Valley, annual, 228 South Third street, Philadelphia, Jan. 21.

Mobile & Ohio, annual meeting of the holders of the general mortgage bonds, company's office, 11 Pine street, New York, Jan. 29.

New York, Pennsylvania & Ohio, annual, company's office, 121 Euclid avenue, Cleveland, O., Feb. 4.

San Pete Valley, special, company's office, Nephi, Utah, Jan. 23.

Worcester, Nashua & Rochester, annual, 314 Main street, Worcester, Mass., Jan. 22.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Fort Wayne & Jackson, annual, company's office Jackson, Mich., Jan. 25.

Lehigh Valley, annual, 228 South Third street, Philadelphia, Jan. 21.

Mobile & Ohio, annual meeting of the holders of the general mortgage bonds, company's office, 11 Pine street, New York, Jan. 29.

New York, Pennsylvania & Ohio, annual, company's office, 121 Euclid avenue, Cleveland, O., Feb. 4.

San Pete Valley, special, company's office, Nephi, Utah, Jan. 23.

Worcester, Nashua & Rochester, annual, 314 Main street, Worcester, Mass., Jan. 22.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The next meeting of the *American Society of Railroad Superintendents* will be held on Wednesday, Sept. 9, at Niagara Falls.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Westeyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at their rooms, at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, ex-

¹ B & O. & C. v. Paul, 40 N. E. Rep., 519.

² Deloit v. S. & P., 40 Pac. Rep., 39.

³ Cla. & v. C. R. & B., 66 F. d. Rep., 803.

⁴ Kearney v. C. N. J., 31 Atl. Rep., 637.

⁵ R. & C. v. Evans, 66 Pac. Rep., 879.

⁶ Roberts v. N. P. e., 15 S. Ct. Rep., 755.

⁷ Appeal of Great Northern, 62 N. W. Rep., 826.

⁸ N. Y. C. & St. L. v. Speelman, 40 N. E. Rep., 541.

⁹ Hall v. C. & M., 31 Atl. Rep., 940.

¹⁰ P. C. C. & St. L. v. Welch, 40 N. E. Rep., 630.

¹¹ Mc Ighie v. Macon C. Co., 21 S. E. Rep., 701.

¹² G. C. & S. F. v. Hodge, 30 S. W. Rep., 829.

¹³ St. L. S. W. v. Berry, 30 S. W. Rep., 761.

¹⁴ G. C. & S. F. v. Southwick, 30 S. W. Rep., 592.

¹⁵ Ft. S. W. & W. v. Sparks, 39 Pac. Rep., 1,032.

¹⁶ G. C. & S. F. v. Moody, 30 S. W. Rep., 571.

¹⁷ A. T. & S. F. v. Cameron, 66 Pac. Rep., 709.

¹⁸ Fordyce v. Edwards, 30 E. W. Rep., 758.

¹⁹ Norton v. L. & N., 30 S. W. Rep., 599.

²⁰ A. T. & S. F. v. Rowan, 39 Pac. Rep., 1010.

²¹ Hammond v. Mason, 40 N. E. Rep., 642.

²² A. T. & S. F. v. Rowan, 39 Pac. Rep., 1010.

²³ Rome St. R. Co. v. McGinnis, 21 S. E. Rep., 707.

²⁴ Schlimgen v. C. M. & St. P., 62 N. W. Rep., 1045.

cept in the months of July and August, at the Buffalo Library Building.

New York Railroad Club.

At the regular meeting of the Club on Thursday, Jan. 16, the subject for discussion was on the report of the Committee on the Revision of the M. C. B. Rules of Interchange.

The Manufacturers' Association.

The National Association of Manufacturers will meet in Chicago beginning Jan. 21. The Committee of Arrangements has issued 10,000 invitations. A scheme is on foot for establishing a headquarters in Chicago with a club house.

Canadian Society of Civil Engineers.

The society met on Thursday, Jan. 9, at its rooms, 112 Mansfield street, Montreal. The subject for discussion was, The Most Suitable Shape of Timber for Testing. Discussion on Mr. W. B. Dawson's paper was continued. A paper was read by Mr. C. B. Smith, member, on Cement Testing (Part 2). The meeting then adjourned.

Engineers' Club of Columbus, O.

This club now meets on the first and third Saturdays of each month in the club rooms at 12½ North High street, Columbus, O. The present officers are: President, C. C. Waite (President of the Columbus, Hocking Valley & Toledo road); First Vice-President, W. F. Kelly; Second Vice-President, J. F. Firestone; Treasurer, E. C. Fuller; Secretary, M. S. Hopkins.

Engineers' Society of St. Paul.

A regular meeting of the society was held Jan. 6. Thirteen members and one visitor were present. President Stevens presided. All officers were re-elected. Mr. A. H. Hogeland led the discussion of the evening with a description of the effect of earth slides on the Great Northern Ry. bridges which cross the Red River of the North and its tributaries. Dr. C. F. Loweth explained and illustrated the circumstances of the movement of pier No. 1 of the Northern Pacific bridge at Bismarck.

Engineers and Architects' Club of Louisville.

The annual meeting of the Engineers and Architects' Club of Louisville was held on Jan. 9. The following officers were elected: President, C. J. Clarke; Vice-President, Webster Gazlay; Secretary, James K. Zolinger (re-elected). Directors: Charles Hermansy, Marshall Morris, W. B. Blake, Chas. G. Snead, J. M. Johnson. The report of the Secretary for the year 1895 showed an increase in membership and bank balance over the year 1894. Meetings will be held during the present year on the second Thursday in each month, as heretofore.

Madison Avenue Y. M. C. A.

The twentieth annual meeting of the Young Men's Christian Association which has its headquarters in the "Railroad Men's Building" at Madison avenue and Forty-fifth street, New York City (the Grand Central Station), was held on the evening of Jan. 14, Mr. Cornelius Vanderbilt presiding. Addresses were made by Presidents Clark, of the New Haven, and Depew, of the New York Central. The average daily attendance at the rooms during the past year has been 619.

Indiana Engineering Society.

The society met at Indianapolis on Jan. 9, and the following officers were elected: President, Curtis G. H. Goss, of Martinsville; Vice-President, A. W. Smith, of Kokomo; Secretary, J. F. O'Brien, of Cloverdale; Executive Committee, H. B. Fatout, of Indianapolis; W. M. Whitten, of South Bend, and Robert S. Morrison, of Knightstown.

Papers were read by John V. Coyner, of Marion County, on City Surveying, and by Professor Morley, of Purdue University, on Graphic Method of Computing Stress in Trusses.

Southern & Southwestern Railway Club.

At the annual meeting of this club, Nov. 21, the following officers were elected: President, R. P. C. Sanderson; First Vice-President, W. H. Thomas; Second Vice-President, W. H. Hudson; Treasurer, R. E. Libby; Secretary, S. A. Charpiot.

The subjects for discussion at the meeting of Jan. 16 were: Master Car Builders' Rules; Best Sizes for Pipes and Connections for the Baker Heater; Best Liquid to be Used; Messrs. J. M. Holt and T. S. Lloyd, committee; Present State of the Art of Kindling Locomotive Fires with Oils; Messrs. W. L. Tracy, P. H. Schreiber, and E. T. Silvius, committee; The Best and Most Accessible Plan for Applying Air Brakes to Hopper Gondola Cars having Straight Chutes; Messrs. A. B. Corinth and W. H. H. Price, committee; Inspectors' Gage to Determine the Height of Drawbars; Special committee, Messrs. Jas. Bossinger and Jas. Maglenn.

Western Society of Engineers.

The Western Society of Engineers held its annual meeting at the Auditorium Hotel, Chicago, on the evening of Jan. 8. The announcement of the election of officers for the year was made as follows: President, Mr. J. F. Wallace, Chief Engineer Illinois Central; First Vice-President, Mr. T. T. Johnson, Assistant Chief Engineer Sanitary District; Second Vice-President, Mr. Alfred Noble; Secretary and Librarian, Mr. C. J. Roney; Treasurer, Mr. Emil Gerber; Trustee, Mr. Horace E. Horton, President Chicago Bridge Co.

The new constitution and by-laws were adopted and resolutions of thanks to the Armour Institute were offered for their courtesies to the society during the preceding year. Similar resolutions were offered to the entertainment committee for their service.

After the meeting the annual banquet was held. About 125 guests and members were present.

Mr. Horace E. Horton, the retiring President, introduced the President elect, Mr. John F. Wallace, who made an interesting address. He was followed by the Hon. D. P. Phelps, Mr. George Carman, of the Lewis Institute; Mr. Thomas C. Roney, of the Armour Institute; Mr. J. Reynolds, Mr. A. Mordecai, Mr. Isham Randolph and Capt. R. W. Hunt. Mr. Reynolds made a report in which the plans of the Publication Committee for publishing the society's proceedings were outlined.

Western Railway Club.

The Western Railway Club held its regular monthly meeting Dec. 17, President Potter in the chair, and about 125 persons in attendance. Secretary Crosman read a list of 22 new members. Mr. Willard A. Smith, chairman of the committee on securing a meeting of the International Railway Congress in this country prior to the year 1900, then read a report to the effect that there is no body or committee in existence that could receive or act upon such invitation except the Congress itself, and it could do so only at its regular session, which will not be held until the year 1900, and that it is the opinion of the committee that it will not be wise to make

further efforts to secure such a session prior to the regular meeting of the Congress in Paris in 1900. Further, that the President of the Western Railway Club certify this fact to the American committee of the Congress, with the suggestion that that committee urge upon the Congress the desirability of holding the next regular session thereof, after that of 1900 in Paris, in the United States and in the city of Chicago.

The next order of business was the discussion of Mr. Waitt's very excellent paper on Air-Brake Equipment on Freight Trains and Mr. Rhodes opened the discussion. An abstract of the discussion appears on another page.

Upon motion of Mr. J. N. Barr it was voted to continue this topic until the next meeting.

The paper of the day was then distributed. This paper, Locomotive Service, by J. H. McConnell, S. M. P., of the Union Pacific R. R., was published in the *Railroad Gazette* last week.

Secretary Crosman announced that the afternoon had been so completely taken up with the discussion on Mr. Waitt's paper that the topical talk on Piece Work in Car Shops would be deferred. At the next meeting, he stated, there would be a continued discussion on Mr. Waitt's paper, a discussion on Mr. McConnell's paper on Locomotive Service and also a discussion on the action of the M. C. B. Committee on Revision of Interchange Rules. He also announced that the paper for the next meeting would be by Mr. J. N. Barr, S. M. P., C. M. & St. P. Ry., and would be entitled The Ninety and Nine.

Central Railway Club.

The annual meeting of the Central Club was held Jan. 10 at Buffalo.

In calling the meeting to order, President Samuel Higgins thanked the members for their consideration and asked that the same be accorded his successor. There was ground for reasonable pride to be felt in the work of the past year. The report of the Secretary and Treasurer showed a gratifying increase in membership; there had been but one death, and the financial statement indicated a flourishing condition.

Safe-Ending of Boiler Tubes.—A report from the committee on the "Safe-Ending of Boiler Tubes," was read by the chairman, Mr. J. H. Moore. The committee gave the results obtained from reports, which showed that the lap-welded safe end to tubes when properly made is preferable to the butt-welded. The committee made no test as to the comparative cost, but from the quickness with which safe-end lap-welds can be brought to a welding heat in a furnace designed for these purposes, there being but little time lost in waiting for heats and the welding done by machine, the committee concluded that butt-welding by hand cannot be done as cheaply nor as quickly as lap-welding.

Effect of Salt Water Drippings.—Mr. A. M. Waitt, from the committee on "Effect of Salt Water Drippings from Refrigerator Cars upon Track and Roadbed," presented a report showing the experience of railroad companies and owners of refrigerator cars. From the evidence the committee thought it apparent that general trouble is experienced from these drippings both on the part of the railroads and car owners. Necessity was clearly shown for the exercise of special care on lines affected in inspection of exposed parts of bridges and keeping them well covered with the best salt-resisting paint. The Committee believed it perfectly practicable for the drips on refrigerator cars to be connected with a reservoir or collector near the center of the car, or at each end over center of truck, to hold drip until trains reach regular stopping points when the reservoir can be emptied by trainmen or inspectors, such reservoirs to have an overflow which will permit an excessive accumulation to pass off while the train is running, and be deposited between an axle and brake beam so as to be as far from each rail as possible.

Officers Elected.—The election of officers resulted as follows: President, E. D. Bronner; Vice-President, John Mackenzie; Secretary and Treasurer, Harry D. Vought; members of Executive Committee, A. M. Waitt, E. A. Miller, C. E. Rood, W. H. Gardiner.

The annual banquet was held at the Iroquois in the evening.

PERSONAL.

—Mr. E. A. Dawson, of Waverly, has been appointed State Railroad Commissioner of Iowa.

—Mr. Daniel Breck, Division Superintendent of the Louisville & Nashville, has been appointed Assistant to President M. H. Smith.

—Mr. Samuel Irwin, Superintendent of the Car Department of the Missouri, Kansas & Texas road, died at Sedalia, Mo., Sunday, Jan. 5, of apoplexy.

—Mr. Allen Colby, at one time and for many years Master Mechanic of the Maine Central, died at his home at Brunswick, Me., Jan. 3, aged 87 years.

—Mr. James T. Nelson, of Brooklyn, Treasurer of the company and one of its directors, has been appointed Receiver of the New York & Sea Beach road.

—Mr. A. Egerton Adams, President of the Chicago Forge & Bolt Co. and of the American Bridge Co., of Chicago, died in the latter city of pneumonia last week.

—Mr. William Duncan, Vice-President and Traffic Manager of the Baltimore & Ohio Southwestern, has resigned after many years' service with the company. He is to become President of the Ludlow-Saylor Wire Co., a large manufacturing company of St. Louis.

—Mr. Robert T. Pace, who for some time has been Secretary to Mr. George C. Smith, President and General Manager of the Atlanta & West Point Road and the Western Railway of Alabama, has been appointed Purchasing Agent of both those companies, with office at Atlanta, Ga.

—Mr. H. Delany has been appointed Master Mechanic of the Philadelphia & Reading, being in charge of the Philadelphia & New York Division of the road, with office at Third and Berks streets, Philadelphia. He was formerly Superintendent of Motive Power of the Louisville, New Albany & Chicago Road.

—Mr. Thomas Orchard, Master Car Builder of the Delaware & Hudson, in charge of its shops at Carbondale, Pa., died in that city recently, aged 76 years. He was born in England, but came to this country as a young man. He had resided at Carbondale for many years, in charge of the Delaware & Hudson shops.

—Mr. H. V. Hinckley, Mem. Am. Soc. C. E., for 16 years Assistant Chief Engineer of the Atchison, Topeka & Santa Fe road, has been appointed by the Commissioners of Shawnee County, Kansas, to have charge of the Melan bridge, to be built on Kansas avenue in the city of Topeka across the Kansas River. It will be the largest Melan bridge in America. Keepers & Thacher, of Detroit, are preparing plans.

—Mr. George H. Baer, Treasurer and Secretary of the Western Maryland road, died at his home near Baltimore, last week, after a short illness. For many years he was a member of a grain commission firm in Baltimore, but for six years past had been Treasurer and Secretary of the Western Maryland road. At the time of his death he was also President of the United States Electric Light Co., at Baltimore.

—Ex-Governor W. R. Marshall, of Minnesota, died at Pasadena, Cal., on Jan. 8. Governor Marshall had long been identified with the state of Minnesota, being one of its oldest residents. He established a newspaper at St. Paul, which is now conducted as the *Pioneer Press*, and he was four years governor of the state. Later, from 1874 to 1881, he was State Railroad Commissioner, but since then he has been chiefly occupied with private business.

—Mr. Remsen Crawford, of Atlanta, has been appointed Press Agent of the Plant System, with headquarters at Tampa, Fla. Mr. Crawford has been connected with the Atlanta Constitution for a number of years, and for the past three years has conducted its railroad column, which, as it seems to us, has been the most interesting and reliable chronicle of railroad news published in the South. Both by experience and natural aptitude he is well qualified for the duties of the position to which he has been appointed.

—Mr. Charles W. Smith was last week appointed Receiver of the Atlantic & Pacific by Judge Colyer, of the United States Circuit Court at Albuquerque, Ariz. He succeeds Messrs. Aldace F. Walker and John J. McCook, who resigned a few weeks ago. Mr. Smith was nominated by the committee of the first mortgage bondholders and his appointment was unopposed. He was formerly a Vice-President of the Atchison road. Since his resignation he has lived at Chicago. He is an experienced railroad man and has served as General Manager and in other important positions in the operating and traffic departments on the Erie road, the Chesapeake & Ohio, the Chicago, Burlington & Quincy and a number of others.

—Mr. Thomas Prosser, Sr., for over 40 years a member of the firm of Thomas Prosser & Son, the American representatives of the Krupp Works of Germany, died at his home in Brooklyn, Jan. 10, after a lingering illness. He had not been able to work for about a year. Thomas Prosser was born in Worcester, England, 67 years ago, and came with his parents to this country when he was nine years old. His father, Thomas Prosser, was engaged in the steel business at Paterson, N. J. In 1851 his father organized the firm of Thomas Prosser & Son and began business in Platt street, near Gold street, New York. While visiting the International Exposition at London in 1852 the senior Prosser formed a lasting friendship with Herr Krupp, the founder of the Krupp Works and the father of the present head of the business. Mr. Krupp requested Mr. Prosser to become the American representative of this firm, and the business relations established then have continued uninterruptedly ever since. Thomas Prosser & Son have dealt mainly with railroads, steamship companies and machinery manufacturers. With these their dealings have been at times of very large proportions. Mr. Thomas Prosser, Jr., who is connected with the firm, will probably succeed his father as its head of the business.

—The Pennsylvania Company has created the office of Fourth Vice-President, and Mr. Joseph Wood, who has been General Manager of the Pennsylvania lines west of Pittsburgh for the last five years, has been appointed to the office. The new Vice-President is to have general charge of the operating department of the roads operated by the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis, and is to assist the First Vice-President, Mr. McCrea, also assuming the duties of the latter during his absence. Mr. L. F. Loree, at present superintendent of the Cleveland & Pittsburgh Division of the Pennsylvania lines, has been appointed General Manager of the Pennsylvania Company. These changes in the organization of the Pennsylvania Company have been made necessary by the new policy of the company in regard to the operation of the Vandalia line. Heretofore that company, though controlled by the Pennsylvania, has been operated as a practically independent line, with its own officers. Recently President McKen resigned and other changes have been made, so that hereafter it will be directly operated by Pennsylvania officers. Mr. J. J. Turner, formerly Superintendent of the Pittsburgh division of the P., C. & St. Louis, will have direct charge of its operation. When it was decided to bring the lines of that company into more direct relations with the Pennsylvania Company it became necessary to create the new vice-presidency.

Mr. Wood, like all officers reaching the rank of Vice-President on the Pennsylvania, has been in the company's service many years, his own service dating back to 1864. His advance in rank has followed the usual rule, of service in the engineering, mechanical and operating department. He was Assistant Superintendent of Motive Power at Altoona between 1878 and 1881; then Superintendent of Motive Power of the Pennsylvania Co. up to 1887. In that year he became General Superintendent of Transportation, and in 1890 General Manager.

Mr. Turner's new position gives him charge of the operation of about 500 miles of road. He will have a very important, and undoubtedly a taxing, work in bringing the methods of operation and management into conformity with Pennsylvania practice. For this probably none of the Pennsylvania officers is better qualified. He has had a long experience on the Pennsylvania, and has been a Division Superintendent for 15 years. His unusually rapid promotion is of itself most excellent evidence of his merits as an operating officer. He has been in charge of the Pittsburgh Division since 1888. He is one of the few Pennsylvania Superintendents who is not an engineer.

Mr. Loree, on the other hand, has spent a long time in engineering service. He went to the Pennsylvania in 1877, but left to go into engineering work elsewhere. He returned to its service in 1883 as Assistant Engineer. He has been in the operating department only since 1889, but his management of the Cleveland & Pittsburgh division, which carries nearly all the ore going over the Pennsylvania—a troublesome traffic—has frequently called attention to his methods. His writings are familiar to the readers of the *Railroad Gazette*.

Mr. M. J. Becker, the Chief Engineer of the Pittsburgh, Cincinnati, Chicago & St. Louis, has resigned that office and becomes Consulting Engineer and Real Estate Agent. This change does not affect the position of Mr. Thomas Rodd, who remains as Chief Engineer of the Northwest system. Mr. Thomas H. Johnson, the present Principal Assistant Engineer is Mr. Becker's successor as Chief Engineer of the Pittsburgh, Cincinnati, Chicago & St. Louis. The other changes are noted in another column.

ELECTIONS AND APPOINTMENTS.

Aransas Pass Northern.—The Directors elected for this new Texas road are: Alexander Brown, P. B. McLaren, W. B. Brook, Jr., Andrew D. Jones, of Baltimore, Md.; J. C. Ryan, New York City; C. H. Sawyer, T. B. Wheeler, D. T. McLaren, W. D. Jenkins, N. J. Burrows, J. C. Fulton, Texas.

Atchison, Topeka & Santa Fe.—The Eastern office of this company will hereafter be at 59 Cedar street, New York City, which will be the address of the following officers: Aldace F. Walker, Chairman of the Board; John P. Whitehead, Comptroller; H. W. Gardiner, Assistant Treasurer; and L. C. Deminz, Assistant Secretary. Mr. C. B. F. Palmer has been appointed Private Secretary to the Chairman of the Board.

Atlanta & West Point.—Robert T. Pace has been appointed Purchasing Agent for this company and the Western of Alabama, with office at Atlanta, Ga.

Baltimore & Cumberland.—The stockholders of the railroad met in Chambersburg, Pa., last week and re-elected the old Board of Directors, as follows: J. M. Hood, D. J. Foley, Baltimore; C. W. Humrichouse, Williamsport; J. W. Humbird, Cumberland; George P. Cole, J. W. McPherson, Shippensburg; John P. Culbertson, W. F. Eyster, Chambersburg. A. M. Eichelberger, of Hanover, was made President; D. J. Foley, Treasurer and Hon. T. McMahon Secretary.

Brooklyn Elevated.—The annual election of Directors of the company was held last week with the following result: Elisha Dyer, Jr., Adolf Ladenburg, Leonard Lewisohn, Henry Sidenberg, Emil Schaefer, Simon Uhlmann, William Halls, Jr., Edward Lauterbach, Frederick Uhlmann, Elbert Snedeker, Jacob Scholle, George W. Wingate and Simon Rothschild. The officers elected are: President, Frederick Uhlmann; Vice-President, George W. Wingate; Secretary and Treasurer, Elisha Dyer, Jr.; Auditor, Walter B. Longyear; Assistant Secretary and Cashier, John W. W. Mitchell; Chief Engineer, O. F. Nichols; General Superintendent, Isaac D. Barton.

Choctaw, Oklahoma & Gulf.—The annual meeting of the stockholders was held at Philadelphia, Jan. 13. The proceedings were confined to the reading of the annual report, which was adopted, and the re-election of the Voting Trustees (in whose names all the capital stock of the company stands), and of the old Board of Directors. The Voting Trustees, who are Samuel Dickson, George R. Earle, Jr., and Effingham B. Morris, cast their ballot for the following ticket: President, Francis P. Gowen; Directors, Charles Hartshorne, Samuel Dickson, George R. Earle, Jr., Sidney F. Tyle, Effingham B. Morris, Alan H. Reed, Charles H. Biddle, N. Thouron and W. A. Wilbur.

Cornwall & Lebanon.—A new Board of Directors was elected at a meeting of stockholders at Lebanon, Pa., Jan. 13. The Board elected B. Dawson Coleman President; Archibald Rogers, Vice-President; E. R. Coleman, Secretary.

Dallas Terminal.—The annual meeting of the stockholders of the Dallas Terminal Railroad and Union Station Company was held at Dallas, Tex., Jan. 7. The following Board of Directors was elected to serve the ensuing year: W. C. Connor, Alex. Sanger, J. C. O'Connor, E. M. Reardon, B. Gibbs, W. O'Connor, J. E. Schneider.

Denver, Cripple Creek & Southwestern.—The names of the incorporators of this new company are: Cyrus W. Fisher, Earl B. Coe, W. W. Borst, William G. Evans and James T. Cornforth, J. P. Heisler, James H. Blood, F. W. Crocker, Alexander Berger, John W. Nesmith, M. Spangler, James A. Fleming and H. C. Lowrie all of Denver.

Erie & Pittsburgh.—At a meeting of the stockholders at Erie, Pa., Jan. 13, directors were chosen as follows: Charles H. Strong, Erie; S. Fairchild, New York; George B. Roberts, Philadelphia; M. H. Taylor, Joseph McCarter and William Brewster, Erie. Charles H. Strong was re-elected President and William Brewster Secretary and Treasurer.

Gulf, Colorado & Santa Fe.—At a special meeting of the Board of Directors, held at Galveston, Jan. 14, Aldace F. Walker was elected Chairman, vice Edward King, resigned; E. P. Ripley was elected President, vice Aldace F. Walker, resigned; Paul Morton was elected Fourth Vice-President and Victor Morawetz was elected General Counsel, vice Col. John J. McCook, resigned.

Ishpeming & Lake Superior.—The following directors have been elected for this new company operating a line between Marquette and Ishpeming, Mich.: William T. Mather, J. H. Wade, J. H. Hoyt and W. G. Pollock, of Cleveland; James Laughlin and B. F. Jones, Jr., of Pittsburgh, and George W. Hayden, of Ishpeming. The officers are: President, William G. Mather; Vice-President, James McLaughlin, Jr.; Treasurer, W. G. Pollock; Secretary, J. H. Hoyt; General Counsel, George W. Hayden, Ishpeming. S. S. Neff is Chief Engineer of the road, with headquarters at Marquette, Mich.

Lima Northern.—N. M. De Brun, of Columbus, O., has been appointed Assistant Chief Engineer.

Northern Neck.—A meeting of the stockholders of this proposed Virginia road was held at Petersburg, Va., last week. The following Board of Directors was elected: C. A. Troupe and S. H. Leszensky, of New York; W. A. Little, Jr.; W. A. Jones, Lloyd L. Smith, Col. R. J. Washington, of Virginia; T. J. Alford and F. L. Rodgers, Bridgeport, Conn. A meeting of the directors will be held this month in New York to elect a president.

North Hudson.—This company has elected the following Directors: Miles Tierney and Robert W. De Forest, of New York; Col. Edwin A. Stevens, of Hoboken; Robert F. Ballantine and F. Herbert Ballantine, of Newark; Nicholas Goetz, of Union Hill; Henry Offerman, of Brooklyn; and Fitch J. Mallory and Allan L. McDermott, of Jersey City.

Northwestern Elevated (Chicago).—At the annual meeting of the company last week, in Chicago, the following Directors were elected: D. H. Louderback, L. S. Owsley, E. W. Sherman, J. L. Cochran and Howard Abel.

Norwich & Worcester.—The annual meeting of the stockholders was held at Worcester, Mass., Jan. 8. George H. Ball, of Boston, who has been President for eight years, declined re-election to the Board of Directors. The Board was elected as follows: Edward L. Davis, Thomas B. Eaton, Josiah H. Clarke, Francis H. Dewey and A. George Bullock, all of Worcester; Charles Cogswell, of Norwich, Conn.; William T. Hart, of Boston; Edward C. Thayer, of Keene, N. H., and Stephen Salisbury, of Worcester. A. George Bullock was elected President and M. N. Whittemore Secretary and Treasurer.

Pennsylvania Co.—The Board of Directors of the Pennsylvania Company and the Pittsburgh, Cincinnati Chicago & St. Louis Railroad met at the Broad Street Station, Philadelphia, Jan. 14 and elected Joseph Wood Fourth Vice-President of both companies. The following appointments were also made: L. F. Loree, General Manager of both roads; W. H. Scriven, Superintendent of the Cleveland & Pittsburgh division, Pennsylvania Company, vice Loree, promoted; L. L. Gilbert, Assistant Counsel of the Pennsylvania Company.

M. J. Becker resigned as Chief Engineer of the Pittsburgh, Cincinnati, Chicago & St. Louis, and was appointed Consulting Engineer and Real Estate Agent; Thomas H. Johnson was appointed Chief Engineer, vice Becker. G. L. Peck was appointed Superintendent of the Pittsburgh Division of the Pittsburgh, Cincinnati, Chicago & St. Louis, vice J. J. Turner, transferred to the Vandalia lines. Sherman May was appointed Superintendent of the Richmond Division, vice Peck, and Ralph Peters, General Agent at Cincinnati, in addition to his duties as Superintendent of the Cincinnati Division of the Pittsburgh, Cincinnati, Chicago & St. Louis.

These changes are all promotions for the officers named and in accordance with the usual Pennsylvania policy. Mr. Johnson, the new Chief Engineer, has been principal Assistant Engineer under Mr. Becker. Mr. Scriven has been Engineer of Maintenance of Way at Allegheny, Pa. Mr. Peck has been transferred from the superintendency of the Richmond Division, and his successor as Superintendent there was formerly Trainmaster at Logansport, Ind. Mr. Gilbert was formerly Assistant to the General Counsel, and has had long experience in the claim and other departments. He is prominent in the Freight Claim Association.

Perry County (Pa.)—Dr. A. R. Johnston, of New Bloomfield, has been made Treasurer, vice W. N. Seibert, resigned.

Philadelphia & Reading.—The annual meeting of the stockholders was held at Philadelphia on Jan. 13. The following Directors were re-elected without opposition: President, Joseph S. Harris; Managers, A. J. Antelo, James Boyd, Joseph F. Sinnott, Thomas McKean, John Lowber Welsh and George F. Baer; Treasurer, William A. Church; Secretary, William R. Taylor.

Philadelphia, Wilmington & Baltimore.—These Directors were re-elected at the annual meeting: George B. Roberts, William Sellers, Jacob Tome, John P. Green, Benjamin F. Newcomer, Frank Thomson, Skipwith Wilmer, Hon. Edward Lloyd, Henry D. Welsh, E. T. Warner, German H. Hunt, B. B. Comegys, N. P. Shortridge, Preston Lea and John Cassels.

Plant Lines.—W. H. Young has been appointed Master Mechanic of the Florida Southern road, Charlotte Harbor Division, with headquarters at Sanford, Fla.

Remsen Crawford has been appointed Press Agent of this system, with headquarters at Tampa Bay Hotel, Tampa, Fla.

Port Jervis, Monticello & New York.—A complete change in the administration has been made. Thomas Waller, ex-Governor of Connecticut, has been made President, vice Charles D. Haines, resigned. George N. McKibben, of New York City, takes Laff Pence's place as Vice-President. The Secretary is Frederick C. Reed and Treasurer S. Harrison Wagner, both of New York City.

Pullman's Palace Car Co.—James Ramsay, heretofore Acting Lumber Agent has been appointed Lumber Agent of this company, with office at Pullman.

Seaboard Air Line.—E. E. Anderson, Trainmaster of the Third Division, with offices at Abbeville, S. C., having resigned, E. W. Hinsdale, formerly an assistant in the Trainmaster's office of the Second Division at Raleigh, N. C., will succeed him.

Southern.—E. F. Adams has been appointed General Foreman of Locomotive Repairs, vice C. Phillips, resigned. He has been filling a similar position on the Second Division, at Atlanta, for several years.

Western Maryland.—William Early, secretary to President John M. Hood, has been temporarily appointed Secretary of the road, in place of the late George H. Baer. Edward Early, Chief Clerk and Paymaster in the Treasurer's office, has for the present been appointed Treasurer of the company. Permanent officers will be elected at a meeting of directors, to be held Jan. 29.

Western New York & Pennsylvania.—These Directors have been elected for the ensuing year: Samuel G. DeCoursey, Nicholas Thouron, George E. Bartol, Charles M. Lea, J. Rundle Smith, William C. Bullitt, E. W. Clark, Jr., E. L. Owen, P. P. Pratt, Isaac N. Seligman, Rudolph Flinsch, Frank G. Rogers and Charles A. Brinley.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Arcadia & Betsy River.—About 10 miles of track was laid on this road during the year 1895. The track now ends at its intersection with the Chicago & West Michigan. In the spring the road will be extended $3\frac{1}{2}$ miles to Copemish, where it will connect with the Ann Arbor road. The latter portion of the road is under contract and the grading nearly completed. The road extends from Arcadia, on Lake Michigan, to Copemish, a distance of about 25 miles. It is standard gage and is intended for general freight and passenger traffic.

Charleston, Clendinning & Sutton.—Governor William A. MacCorkle, of West Virginia, President of the road, reports that he has made arrangements in Philadelphia for the extension of the road from Clay Court House, to which point it is now completed and in operation, from Charleston to Sutton, Braxton County, a distance of 50 miles. The work has not been stopped entirely, although not much has been done during the cold weather, but it will now be pushed with renewed vigor to complete the line by July. At Sutton the road will connect with the West Virginia & Pittsburgh, and thence by the way of the Monongahela River road and the Baltimore & Ohio, directly through to Pittsburgh, shortening the distance to Pittsburgh and all western points from the interior of West Virginia and Charleston, by about 60 miles. Gov. MacCorkle also intimates that the road may be extended across the Kanawha River to a connection with the Norfolk & Western.

Chesterfield.—A bill to incorporate this company is now pending in the Virginia Legislature: Augustine Royall, J. P. Gilliam, George E. Gary, R. G. Wood and M. A. Cogbill are incorporators. The capital stock is to be \$50,000.

Chicago, Milwaukee & St. Paul.—The company is said to be planning to build an extension 40 miles in length along Lake Superior. The road now reaches the Lake Superior at Ontonagon, 40 miles west of Keewe-

naw point, and it is proposed to build to the rich copper district of Houghton and Calumet. The 40 miles of line would open many very rich copper deposits, and would reach one of the largest hardwood forests of the northwest. The Keewenaw copper country is now reached by but a single road, the Duluth, South Shore & Atlantic.

Chicago & Indianapolis Terminal Co.—This company has been incorporated with a capital of \$50,000, to build connecting tracks and warehouses. Its headquarters will be in Chicago.

Cincinnati & Jackson.—Work on this road, the Jackson extension of the Cincinnati, Jackson & Mackinaw, has been delayed by the cold weather, but two miles of track has been laid out of Addison. The road is being graded all the way from Addison to Jackson, 18 miles. Track-laying machines will be used later on. It is expected to have the road completed by March 1.

Fort Smith & Western Coal Railroad.—This company has filed articles of incorporation at Little Rock, Ark. The road proposed will be 81 miles in length, from Fort Smith in a southwesterly direction to the western boundary line of Arkansas and the Indian Territory, thence through the Choctaw Nation, through the counties of Scullyville, San Bois, Gaines, and Tobucksey to a point on the Missouri, Kansas & Texas, between McAlester and South Canadian. The capital stock is \$1,250,000. The directors of the new corporation are as follows: Eli J. Crandall, Fort Smith; Thomas R. Tennant, Arthur Vail, Huntington; F. W. Bond, Willard P. Heath, St. Louis.

Georgia & Alabama.—The engineers engaged in surveying the proposed extension from Lyons east to Savannah have completed the surveys for two lines between Lyons and Meldrim, and are now engaged in going over routes from Savannah to Meldrim. Estimates of construction by the various routes will be completed soon, and the company will decide by which route the road will build into Savannah, provided it fails to purchase the branch between Meldrim and Lyons, owned by the Central of Georgia. It will require about 75 miles of new road to reach Savannah from the company's present terminus at Lyons.

Kansas City, Pittsburgh & Gulf.—The branch in Texas, from Taylor's Bayo connection on the Sabine & East Texas road to Port Arthur, at Sabine Pass, a distance of about five miles, will be completed in two weeks. L. J. Smith is the contractor for the work.

Lima Northern.—The line has been completed to Malinta, north of Leipsic, O., where connection has been made with the Toledo, St. Louis & Kansas City. Contracts have been let for new stations at Ottawa and Leipsic.

Marietta & North Georgia.—It is stated that the branch of this road to Murphy, N. C., now a narrow gage, will be made standard gage, and that the main line of the road will be extended from Marietta to Atlanta, a distance of 20 miles. It is also reported that a connection with the Southern Railway will be made by building a bridge across the Hiwassee River at Murphy, N. C.

Mexican Northern.—This company, which according to press reports has purchased the 26 miles of track owned by the Rio Grande Northern Railroad, extending from Chispa Station, on the Southern Pacific road, in Texas, to the San Carlos coal fields, near El Paso, will extend its line from Sierra Mojada, to connect with the new road at San Carlos, making a through line from Chispa, Tex., to Escalon, Mex., where connection is made with the Mexican Central road.

Missouri, Kansas & Texas.—A surveying party of the company has finished running a line from Holden to Independence, Mo., where it is said the proposed new extension of the Kansas City division will make connections which will give the company a more direct and shorter line from Sedalia to Kansas City than over the present route, via Paola, Kan.

Mobile & Birmingham.—President T. G. Bush has been in conference with citizens of Selma, Ala., as to extending his road to that city. The track of the Southern is now used for 14 miles from Marion junction, in order to reach Selma.

New Roads.—A local company is being organized at Paris, Tex., to build a road from Paris to Hooks Ferry, on the Red River, 30 miles northeast. The object in building the road is to reach the timber. The road will cross Red River at Hooks Ferry and be extended 16 miles further to Little River, in the Choctaw Nation, where there is much fine timber. John Martin and H. N. Fitzpatrick, of Paris, are active in the organization of the new company.

Norfolk & Western.—The contract for double-tracking a portion of the Elkhorn extension has been awarded to John Sexton, of Roanoke, Va. The second track will extend from Vivian to Bluefield, W. Va., in the Flat Top and Elkhorn coal-field district. The second track over this portion of the road has been needed for a long time, and the revival of the coal traffic within the past three months has greatly accentuated the need. There have been a number of costly wrecks on this portion of the road, due to the inability to move the traffic over a single track. The Pocahontas Coal Co., agent for the coal operators in the Norfolk & Western field, has contracted with the Illinois Steel Co., of Chicago, for the delivery of 500,000 tons of coke this year, to be delivered at the rate of about 30,000 tons a month. All this will be shipped via the Norfolk & Western from Elkhorn to Chicago.

The Dingess branch of the Norfolk & Western, which leaves the main line near Dingess, and runs five miles through good coal territory, has been completed, and is now in use. The road is an important feeder, there being five large coal works in the five miles. The work was done by Hughes & Munday, of Huntington, W. Va.

North Carolina.—The litigation instigated by the Farmers' Alliance to annul the charter of this road, on account of its lease to the Southern Railway, as heretofore explained in these columns, has not interfered with the valuable betterments which the Southern has been making. The work of laying heavier rails between Greensboro and Selma (which becomes a part of the new route to Norfolk) goes on, as well as the strengthening of the bridges. The new route into Norfolk has already been opened, heavy freight trains passing through last week, and the passenger and mail service is expected to be in operation this month as soon as steamer service to Baltimore can be arranged.

North Dakota & Minnesota.—This company has filed articles of incorporation at St. Paul. It is a farmers' organization, designed to build a feeder for the Duluth to Dakota, often called the Hines road, extending through North Dakota and Minnesota to Lake Superior. The capital stock is \$100,000.

Orting & Southeastern.—J. S. W. Shelton, of Shelton, has just completed the survey for a two mile exten-

sion of this road owned by the St. Paul & Tacoma Lumber Co., and extending into a large belt of timber to the southeast of Orting, Wash.

Ottumwa & Eddyville.—The building of a road under this name, in Iowa, between the towns mentioned in the title, has been taken up by the Ottumwa Board of Trade. No definite action has yet been taken and the Board will first try to induce the Atchison, Wabash, Iowa Central and Chicago & Northwestern to take up the project. Some surveys have been made, but nothing decided upon as to the best route. The proposed road would be from South Ottumwa northwest following the Des Moines River to the Iowa Central's bridge at Eddyville. This would require about 16 miles of track. The character of work is not difficult.

Pittsburgh & Lake Erie.—Engineers are surveying a line in Youngstown, O., from the Pittsburgh & Lake Erie to connect with the Lake Shore road. The right of way has been secured, and the construction of the connecting link will be rapidly pushed. Under the present arrangement all freight passing between the Pittsburgh & Lake Erie and the Lake Shore runs over a short line owned by the Erie Railroad.

Pueblo & Silver Cliff.—A company consisting of Hon. J. N. Carlile, H. R. Holbrook, J. B. Orman and S. I. Muston, interested in the Pueblo & Silver Cliff Railroad project, are to go over the country between the two towns this month. If a route is found practicable, it is understood that the road will be built as soon as possible through the Wet Mountain valley to Silver Cliff.

Rio Grande Western.—A contract has been closed for grading 20 miles of an extension from Salina, south to Richfield, Utah. The work is to begin as early in the year as possible and is to be completed not later than June 1. The line will extend a few miles beyond Richfield, and will give the company traffic from an important mining district, heretofore served only by the Union Pacific, including the Marysville mines.

Rock Island, Muscatine & Southwestern.—Articles of incorporation were filed with the Secretary of State by this company, at Springfield, Ill., last week. It is proposed to build a road from Rock Island down the Mississippi River to a point opposite the city of Muscatine. The incorporators and first Board of Directors are: Daniel Hayes, Omaha, Neb.; James G. Britton, Andalusia, Ill.; John C. Kille, Rock Island, Ill.; Ira N. Buffum, Andalusia, Ill.; Chester Lillibridge, Muscatine, Ia.; William McWhirly and James M. Beardsley, Rock Island.

Virginia.—The contract for the first 30 miles of this line, from Huntington, W. Va., to the Lincoln County line, will be let on Jan. 25. The grading is to begin in February. A meeting of the stockholders will be held in New York City on Jan. 21, when the location of the line after leaving the valley of the Guyandotte River will be decided. The road is to extend from Huntington by way of the Guyandotte River valley to the Virginia line. The engineers have completed the final surveys for the first 30 miles from Huntington, and are working beyond that point. Preliminary surveys were made for the road several years ago.

Waynesburg & Ten Mile.—A movement was set on foot in Greene County, Pa., last week for the building of a ten-mile line of road from Waynesburg to the village of Ten Mile, to connect Waynesburg with the Pittsburgh, Monongahela & Wheeling road, which is now building by way of Ten Mile village.

West Virginia Southern.—Boone County, W. Va., will vote on Feb. 1 on a proposition to issue bonds to the amount of \$40,000 to this road to build the road through Boone County. No doubt is felt that the proposition will carry. The road is now in operation from Brownstown, W. Va., on the Chesapeake & Ohio, to the head of Lens Creek, 12 miles, through a fine coal and timber country, which is developing rapidly. Boone County has no railroad, but is rich in natural resources, which include coal, timber, iron and lead. Col. R. T. Herndon is President of the company.

Electric Railroad Construction.

Ballston Spa, N. Y.—Application has been made to the Highway Commissioners for a franchise to build an electric railroad from this place to Peck City Falls, by parties from New York, who are representing A. N. Chandler & Co.

Charleston, W. Va.—Vandergrift & Jacobs, of 1404 South Penn Square, Philadelphia, are building the electric road here four and a half miles long. Rolling stock is needed. The Capital City Street Railroad Co. is changing its power from horses to electricity.

Chicago, Ill.—Arrangements for building the Englewood & Chicago Electric Street Railroad have been made, and it is expected that at least 14 miles, or about one-fourth of the entire trackage, will be in operation by April. The cars are to be equipped by the Electric Storage Battery Co., of Philadelphia.

The Council at its session last week passed an ordinance granting to the General Electric Co. a franchise for an electric railroad on Custom House place and Plymouth place, and including a double route into the residence district as far south as Fifty-seventh street.

Cincinnati, O.—It is proposed to build an electric road from here to Oakley, for which three routes have been surveyed. Any one of the proposed lines will require about one mile of track to be built.

Easton, Pa.—Surveyors are at work upon a route for the proposed new electric railroad, to connect Valley, N. J., on the Lehigh Valley Railroad, with Lake Hopatcong.

Elizabeth, N. J.—The Elizabeth Street Railroad Co. will change its power from horses to electricity. The power station will be on the site formerly occupied by the Metropolitan Gas Works, and will also generate electricity for lighting the city.

Hamilton, Canada.—The International Radial Railway Co. has received from the Dominion Parliament a charter for building a railroad radiating from Hamilton in four directions; the Georgian Bay division to extend northwest from Hamilton, through Guelph, to Owen Sound, a distance of about 110 miles; the Huron division, from Hamilton westerly through Galt, Berlin and Waterloo to Goderich on Lake Huron, 90 miles; the western division to pass through Brantford and Woodstock to St. Mary's, 70 miles, with a branch of 35 miles from Brantford to a point on Lake Erie near Long Point; and the Buffalo division extends to Fort Erie or Buffalo, 55 miles, with a branch of 20 miles to the mouth of the Grand River, a large coal receiving harbor, making a total of 380 miles. The company proposes to con-

struct, during the coming summer, 30 miles of the Georgian Bay division as far as Guelph, and also 44 miles of the Huron division as far as Waterloo, and will continue the construction each year thereafter until the lines are completed. The charter permits the operating of the lines by steam, electricity or other motive power and the company expect to use storage batteries or gas engines for suburban traffic and steam for freight and through traffic. Joseph Powell is Chief Engineer.

Haverhill, Mass.—The Pierce Construction Co. has been awarded the contract to build the new Haverhill, Georgetown & Danvers electric railroad, and work will be begun at once.

Houston, Tex.—Work on the improvement of the Houston City Street Railroad will begin not later than March 1. It is intended to replace the 25-lb. rails and the 45-lb ones now in use with 60-lb. rails, and if possible to extend some of the belt lines in the Third and Fifth wards. The road is in the hands of a receiver.

Jackson, Tenn.—The Jackson Street Railroad Co. is making arrangements to construct its electric road.

Kingston, Ont.—The Colonial City Railroad, which was sold at foreclosure, has been reorganized into the Colonial City Traction Co. with a capital of \$175,000. Some of the directors are: Charles M. Preston, John E. Kraft and Gilbert D. B. Hasbrouck, of Kingston; John I. Waterbury and August Belmont, of New York City, and William F. Russell, of Saugerties.

Long Branch, N. Y.—The Long Branch Commission has granted the Atlantic Coast Electric Railroad Co. a franchise to cross Cedar Park, Lincoln and North Lincoln avenues. Among the provisions of the contract are the planking of all crossings and the maintaining of a flagman at all crossings. The road must be completed by May 1.

Lorain, O.—The Council has granted an extension of 90 days on the Mauldin Street Railroad franchise, which was recently purchased by Messrs. E. K. Mussey, W. G. Sharp, A. L. Garford, and H. H. Clough, all of Elyria. The new company proposes to build a street railroad from Wellington to Lorain, via Oberlin, Elyria, North Amherst and South Amherst, a distance of 30 miles. This road will have little competition from steam railroads, while at the same time it connects five different lines.

Moundsville, W. Va.—The Benwood & Southern Electric Railroad Co. has completed its line almost to the city, and has cars running over a portion of the line. The road runs from Benwood, where it connects with the Wheeling lines to Moundsville, eight miles, and from there to the Methodist Camp Meeting grounds, two miles.

New York.—The State Board of Railroad Commissioners last Tuesday approved the request of the Metropolitan Traction Co. for permission to use the underground trolley system on Lexington avenue, between 105th street and the North River, and on the Twenty-third street line.

Niagara Falls, N. Y.—The Lewiston & Youngstown Electric Railroad Company has secured its right of way in both Lewiston and Youngstown.

Parkersburg, W. Va.—The City Council has extended till July 1 the time in which the Park City Street Railroad Co. shall change its power from horses to electricity. The work of changing was begun about six months ago, and much of the grading is completed, but it was found impossible to proceed with the work as rapidly as was desired on account of the inability to get rails.

Pasadena, Cal.—Arrangements have been completed by the Electric Railroad Company with E. J. Baldwin, to extend the road to Santa Anita, from Colorado street, A. G. Chapman having agreed to open an extension of Colorado street, 80 ft. in width, through his ranch property.

Philadelphia.—The Union Traction Co. is preparing to put in operation another new line from Sixteenth and Jackson streets, by way of Christian and Ellsworth, Seventh and Ninth streets, to Richmond. Plans have also been drawn for an extension of the road from the present terminus at Chestnut Hill to the Convent, where it will connect with the Philadelphia & Norristown and the Manayunk & Roxborough lines; and for a line running to the Bethlehem Turnpike. It is intended to have the latter in operation before next summer. The new line will be about six miles long, the material for which has been ordered.

The bridge over the Pennsylvania Railroad on the Fox Chase extension of the Electric Traction Division has been completed and tracks laid over it.

Port Chester, N. Y.—An organization has been effected in Greenwich, Conn., of the Port Chester & Glenville Tramway Co. to build an electric road. The directors are David J. Pearsall and Thomas S. Krutz, of New York; Winthrop G. Bushnell, of New Haven, and James H. Hunt and R. Jay Walsh, of Greenwich. The cost of the road will be about \$75,000.

Richmond, Va.—The Bridge Water & Piedmont Electric Railway Co. has been incorporated by J. L. Deleplaine, J. E. Sanger and others to build a railroad from the Chesapeake & Western Railroad in Rockingham County to the James River in Nelson or Amherst County, with lateral branches not over 25 miles in length. The capital stock is \$500,000, which may be increased to \$5,000,000.

The Richmond Traction Co. has begun work on its electric line on Broad street. J. Skelton Williams is President.

Rochester, N. Y.—The Windsor Beach & Summer-ville Electric Railroad Co. has been incorporated to build a line from Forest Lawn to Summerville, along the lake shore, six miles. The road, the report says, is to be completed by July. E. O. McNair, of Warsaw, N. Y., and Edward Elwanger, A. J. Johnson and J. C. Tine, of Rochester, are interested.

Spokane, Wash.—The work on the Trail Tramway Co.'s line has been started again near Trail Landing. Only a small force of men will be kept on the cliff this winter. The company has taken offices in Roseland, Wash.

Syracuse, N. Y.—The State Railroad Commission has granted permission to the Syracuse & Oneida Lake Electric Railway Co. to build a road from Syracuse to Oneida Lake. The road will be about 11 miles long.

Tacoma, Wash.—The Seattle, Tacoma & Portland Electric Railway Co. is being organized to build an electric railroad from Tacoma to Seattle, and finally to Portland. H. L. Thomas, of Seattle, is interested.

Washington, D. C.—Work on the Maryland & Columbia Electric Railroad is going on at three different places. Work between Laurel and Branchville pro-

gresses rapidly, and it is thought that the grading of the entire line will be completed before spring.

The grading of the Maryland & Columbia Railroad is being done at three different places, and it is expected to have it finished by spring.

Waterloo, Ia.—The Waterloo & Cedar Falls Rapid Transit Co. has been incorporated with a capital stock of \$600,000 by C. J. Fasselmann, J. H. Bowman, L. S. Cass and J. H. Rafferty, to construct a street railroad between Cedar Falls and Waterloo.

GENERAL RAILROAD NEWS.

Brooklyn Elevated.—The annual report, published last week, shows a surplus for the year to Dec. 31 of \$64,930. There was a deficit of \$54,660 as a result of operations in 1894; so that the net surplus is \$10,320. The earnings from passengers were \$2,003,377, and the total earnings were \$2,082,684. Operating expenses were \$1,170,949, of which \$752,938 was the pay-roll account and \$295,619 was for coal. The fixed charges were \$846,745. President Uhlmann in his report says: The construction of the Seaside & Brooklyn Bridge Elevated Railroad is substantially completed, the cost of which to Dec. 31, 1895, was \$1,623,913, including the "loop" through Sands, High and Fulton streets, and but \$50,000 more will be required for its full completion. To do this but 1,365 of the first mortgage bonds of the Seaside & Brooklyn Bridge Elevated Railroad were sold, realizing in cash, at 92½ per cent. and interest, \$1,279,952. The difference of \$343,961 accounts for and is included in the time loans of \$410,000 made by the company, and therefore the company is not in need of offering any security on the market for construction purposes. An agreement was entered into with the Long Island Railroad resulting in through rapid transit from the Brooklyn Bridge and intermediate stations to Manhattan Beach, which must result in increasing the company's summer earnings, when increased earnings are most appreciated.

Carolina Midland.—The anticipated lease of this road, referred to in these columns a week or two ago, was publicly announced last week. The lease is assumed by a new company called the Greenwood, Anderson & Western, and the formal transfer of the property to the new company is to be made this week. As stated in the note published previously it is expected that arrangements will be made for extending the road westerly through the State in the direction of Greenwood. Michael Brown, President of the old company, retains that office.

Choctaw, Oklahoma & Gulf.—The annual report, published this week, covers a period of 13 months, ending October 31, 1895. It shows total earnings of the railroad of \$358,310; operating expenses, \$210,626; net earnings, \$147,683. The returns from the mining department were: Gross earnings, \$607,671; expenses, \$550,307; profit, \$57,363, thus making the surplus from both properties \$205,047. The fixed charges are \$323,650. President Gowen says: "The business of the company since the new line was opened has been satisfactory, and justifies the expectation that the estimates of the earning capacity of the company, which formed the basis for the reorganization plan, will be realized. The net earnings of both departments for October amounted to upwards of \$29,000. This result was attained under conditions which added materially to the cost of operation and with an incomplete service of trains, as no through passenger service was in effect, and the earnings from that source, as well as from the mail and express service were consequently less than they would otherwise have been. In addition to this the output of coal was seriously affected during that month by the delay in the completion of the new coal-cutting plant at the Anderson mine, which made it impossible to fill the orders received, the unfilled orders at the end of the month aggregating upwards of 12,000 tons."

Denver, Leadville & Gunnison.—Judge Hallett in the United States Court at Denver, has decided not to give a decree for the foreclosure sale of the road at the present time. He said that the matters set forth in the cross-bill filed by the Union Pacific should first be settled, and the question in regard to the ownership of the Denver Union Depot stock should also be settled. The road is now operated by Receiver Frank Trumbull, who is also Receiver of the Union Pacific, Denver & Gulf.

East Shore Terminal.—Judge Simonton, in the United States Circuit Court at Charleston, S. C., has appointed W. E. Huger Receiver of this company operating a line along the water front of Charleston. The road was built two or three years ago. Mr. Huger is Vice-President of the company.

Galveston, La Porte & Houston.—T. W. House and M. T. Jones, of Houston, Tex., have been appointed Receivers of this property by Judge Bryant of the United States Circuit Court. The road is a new line about completed between Galveston and Houston, with the exception of a draw in the bridge across West Bay at Galveston. The section between Houston and La Porte, 16 miles, was built last year and is in operation. In February last, a consolidation with the North Galveston, Houston & Henderson, the Galveston Western and the Houston Belt & Magnolia Park line was effected, and the construction of the connecting lines between these roads to make a through line between Houston and Galveston was started. The amount of new track necessary to connect these lines aggregates about 37 miles and the work is just about completed. The company's new bridge across Galveston Bay is practically finished and the erection of the steel draw is all that remains to complete the road. J. Waldo, of Houston, is President.

Georgia, Midland & Gulf.—The foreclosure sale of this property under the decree of the United States Circuit Court of Georgia has been fixed for Feb. 1, at Columbus, Ga. The foreclosure decree was obtained in the suit of the Central Trust Co., New York, trustee of the bonds. The property to be sold includes the 100 miles of road from Columbus northeasterly to McDonough in Henry County now in operation, and the franchise, right of way, etc., for the proposed extension for the present terminus to Athens, Ga. The road has been operated by a receiver since January, 1893, when Mr. John F. Flournoy was appointed to that office. An upset price of \$500,000 for the property has been fixed by the court.

Illinois Central.—The income from traffic for the five months ended November 30, 1895 and 1894 is reported as follows:

	1895.	1894.	Inc.
Miles operated.....	2,788	2,888	
Gross earn.....	\$9,170,038	\$8,076,520	\$1,093,538
Exp and taxes.....	5,961,032	5,845,505	115,547
Net earn.....	\$3,209,006	\$2,231,015	\$977,991

The gross receipts from traffic for the month of December, 1895, are estimated at \$2,004,987; the receipts for

December, 1894, were \$1,751,486, the estimated increase being \$343,501.

Louisville & Nashville.—The earnings for the six months ending Dec. 31 are given in the following table:

	1895.	1894.	Inc. or dec.
Gross earn.....	\$10,712,225	\$10,186,878	I. \$525,347
Oper. exp.....	6,540,425	6,109,195	I. 431,230
Net earn.....	\$4,171,802	\$4,077,683	D. \$94,119
Fixed charges.....	2,554,170	2,520,766	I. 33,404
Balance.....	\$1,617,632	\$1,556,917	D. \$60,715
Other income.....	180,176	179,844	I. 332
Total.....	\$1,217,808	\$1,433,861	D. \$216,053
Loss on leases, etc.....	131,532	1,036,427	I. 904,895
Surplus.....	\$1,086,276	\$400,434	I. \$685,842

New York Central & Hudson River.—Earnings for various periods are given below:

	1895.	1894.	Inc.
Gross earnings.....	\$4,020,847	\$3,644,906	\$375,941
Quarter Ended Dec. 31.			
Gross earnings.....	\$12,407,896	\$11,318,228	\$1,089,668
Six Months to Dec. 31.			
Gross earnings.....	\$24,008,402	\$22,159,051	\$1,849,351

New York & Sea Beach.—James T. Nelson was last week appointed receiver for this company in a suit brought by William O. Platt and William Mann, trustees of the bondholders, who are foreclosing a mortgage amounting to about \$300,000. This road operates only about six miles of track from the city of Brooklyn to Coney Island. It is the road on which the serious accident occurred at Woodlawn on Labor Day of last year, where two persons were killed and more than 50 injured. Since that accident claims for damages amounting to more than \$1,000,000 have been filed against the company. It is said that its taxes for the last eight years, amounting to about \$65,000, remain unpaid. To anticipate any action unfavorable to their claims the bondholders decided to begin this foreclosure suit.

Norfolk & Carolina.—A mortgage to the Safe Deposit & Trust Company of Baltimore, to secure \$500,000 second mortgage 50 year five per cent. gold bonds has been filed by the company at Norfolk.

Norfolk & Western.—It is understood that the attorneys of the company are preparing a bill which will soon be introduced in the Virginia Legislature and is intended to facilitate the reorganization of the company. The bill will be similar in general terms to the one passed by the legislature affecting the reorganization of the Richmond & Danville.

Northern Pacific.—Andrew F. Burleigh, a lawyer of Seattle, Washington, is now the sole receiver of the property of the road west of North Dakota. James H. Mills and E. L. Bonner, who were appointed receivers for the district of Montana, have been retired, and Mr. Burleigh succeeds to their jurisdiction, thereby securing control of about 68 per cent. of the mileage of the road. This action was taken by Judge Gilbert of the United States Court last week. Mr. Burleigh was appointed Receiver in Washington when Judge Hanford removed Messrs. Rouse, Oakes and Payne, the original receivers. They still have control over the New York offices of the company, because of Judge Lacombe's indisposition to accept their resignations. Two other sets of receivers share the control of the remaining portion of the property, Edward H. McHenry and Frank G. Bigelow, who were appointed Receivers by Judge Jenkins in Milwaukee last September, have jurisdiction over such parts of the road as are in Wisconsin, Minnesota and North Dakota.

Justices Field, Harlan and Brewer, of the United States Supreme Court, are to give a hearing in Washington this week to the attorneys and others interested in the receivership. They will endeavor to learn whether or not some amicable adjustment of present differences may be made, and if not, what course shall then be pursued.

Philadelphia, Wilmington & Baltimore.—The annual report shows that for the year ending Oct. 31, 1895, the total earnings were \$9,142,532; total expenses, \$6,526,890; net earnings, \$2,615,642, making an increase in the net earnings over the previous year of \$269,014. The net earnings of the main line division were \$1,301,928; and of the Baltimore & Potomac, \$619,524. There were deficits on the Cambridge & Seaford, Philadelphia & Delaware County, and Queen Anne's & Kent. During the year nine new engines were received and four miles of branch line were laid. There were used in repairs and renewals 2,993 tons of rails and 390,918 ties. President Roberts says: "Your entire system shared in the returning prosperity of the country, and this, together with the abundant fruit crop on the Peninsula, has brought about very satisfactory results for the year. The Delaware Railroad shows excellent results, and, after earning its regular dividend of 6 per cent., paid over one-half of its surplus of \$107,065 to your company as a profit under the terms of the lease, while also contributing a like amount to the sinking fund for the payment of its funded debt."

Philadelphia & Reading.—The date for depositing the securities of this company under the reorganization plan, formulated by the General Mortgage Bondholders' Committee expired on Jan. 10. It has been announced by J. P. Morgan & Co., that more than a majority of all securities have assented to the provisions of the plan. It appears that over 85 per cent. of the stock and preference bonds has been deposited.

Pre-cott & Arizona Central.—Judge Lacombe, in the United States Circuit Court in New York, last week dismissed the complaint made by this company against the Atchison, Topeka & Santa Fe, and its receivers, and the directors and officers of a number of other companies. The railroad sued for \$8,250,000 damages, alleging that the Atchison and the directors of other railroad companies, by aiding in building the Santa Fe, Prescott & Phoenix and in refusing to interchange business with this company, had conspired to ruin its business. Judge Lacombe dismissed the complaint on the ground that the plaintiffs had been unable to prove any violation of law against the defendants. A stay was granted pending further proceedings in a higher court.

Savannah & Western.—Simon Borg, of New York City, and others, representing the bondholders, filed a deed at Birmingham, Ala., on Jan. 13, formally transferring to the Central of Georgia the properties of the former road purchased at Receiver's sale in Birmingham last October. The Central of Georgia at the same time filed first, second and third preferred income mortgages, the first and third to the Metropolitan Trust

Co., of New York, for \$4,000,000 each, the second to the Manhattan Trust Company, New York, for \$7,000,000.

Wisconsin Central.—At a meeting of the first mortgage bondholders held in New York Jan. 15, unanimous assent was given to the preliminary plan of reorganization recently issued by the committee. The plan, which has as yet been merely outlined by the committee in its report, contemplates foreclosure, and a readjustment of the relations now existing between the Wisconsin Central and subsidiary lines.

Electric Railroad News.

Cleveland, O.—Mayor McKisson has vetoed the ordinance for the Burton Street Railroad as there was no provision for a trackage tax, and the council had refused to accept the provisions for a reduced fare.

Detroit, Mich.—Mayor Pingree has vetoed the ordinances passed a week ago granting new franchises to the Citizens' Street Railroad Co. and to the Fort Wayne & Belle Isle Street Railroad Co.

Springfield, O.—The Krotz underground conduit system for electric street railroads has been given a test on a section of the street railroad. It is said to have worked perfectly during the trial.

St. Louis, Mo.—The 1,500 kw. generator at the Union Depot power house was out recently, and it is estimated that it will cost \$10,000 to repair it. Traffic was delayed for only three-quarters of an hour, as a number of small dynamos were put into circuit to supply the necessary current.

Waterbury, Conn.—The Supreme Court has decided that municipalities have no right to impose a tax on the gross receipts of existing street railroad companies as a consideration for permission to extend their lines.

TRAFFIC.

Traffic Notes.

The Secretary of the Freight Bureau of the Buffalo Merchants' Exchange is Mr. S. M. Forbes.

The Illinois Central on Jan. 1 began limiting all local passenger tickets to one day after the date of sale.

The amount of cotton hauled to market during the past season over the Southern Pacific lines in Texas, up to Dec. 31, was 44 per cent. less than to the same date in 1894.

Mr. J. A. Jennelle has been elected one of the Directors of the Merchants' Exchange, St. Louis, as the "Representative of Transportation Interests." The newspapers say that this is the first time these interests have been represented in the Board of Directors of the Exchange and that it took considerable work to accomplish this result.

The railroads carrying coal to Denver have started a rate war, the principal combatants being the producers in the Northern Colorado lignite district and the Santa Fe Fuel Company. Rates have been reduced so that coals from both districts are being sold in Denver at 40 per cent. less than the usual rates. It is said that the officers of the Atchison, Topeka & Santa Fe are fighting to maintain the rate on their coal at not more than 25 cents a ton above the rate charged for lignite coal. The Union Pacific, Denver & Gulf, which hauls from the lignite district, on Jan. 9 carried the war into the passenger department by severely reducing passenger rates.

Chicago Traffic Matters.

CHICAGO, Jan. 15, 1896.

The Western passenger men have given up trying to adjust the 10 party ride ticket question and adjourned without settling the matter. The Wisconsin Central declined to recede from its position that it would be illegal to refuse to sell these tickets to brokers.

The Western Passenger Association roads have decided not to waive the Association rule requiring signatures to the 2,000-mile mileage books, to be affixed in the presence of an authorized agent of the issuing road.

The Central Traffic Association lines have agreed to put into effect a charge on bicycles, tricycles and baby carriages carried in baggage cars after March 1.

Now that the Joint Traffic Association has gone into effect, the Central Traffic Association is to be disbanded and the freight and passenger business west of the western terminus of the Trunk lines is to be placed in the hands of two committees, to be known as the Central Traffic Passenger and Freight Committees, respectively. Chairman Donald will remain in charge of the Passenger Committee, and Chairman McKnight of the Freight Committee. The passenger committee is expected to be in working order February 1, but the freight committee will not get into shape until probably March 1.

Western lines have agreed to leave the question of any differences over percentages on freight traffic passing through Des Moines, Ia., to Vice-President Truesdale, of the Rock Island, for settlement. The only other question remaining to be adjusted is that of percentages on grain passing through the lower Missouri River gateways. Considerable time was spent last week by the executive officers in an attempt to agree upon these percentages, without result, and the question has been referred to a committee of five.

The Illinois Railroad Commissioners are preparing evidence against the Northwestern, the St. Paul, the Rock Island, the Wisconsin Central, the Chicago Great Western and the Burlington for making the \$2 switching charge at the stock yards. The Atchison has now given notice of a resumption of the charge, and will undoubtedly be included with the other roads. It will be remembered that at the commencement of the agitation the Atchison, being in the hands of receivers and subject to the orders of the courts, was selected as an "easy mark" and an injunction was obtained restraining it from imposing the charge. The reorganized company has promptly joined forces with the other Chicago lines.

Other Central Traffic lines have agreed to ignore the action of the Michigan Central and Wabash in absorbing elevator charges until the matter can be reviewed by the Board of Managers of the Joint Traffic Association.

There is no truth in the rumor that the Santa Fe contemplates taking off its California Limited. There was a conference at which it was proposed to lengthen the running time over all roads between Chicago and Kansas City to 15 hours 45 minutes. If this is adopted, the Santa Fe will make up the time west of Kansas City. The only change that would be made in this connection would be consolidation of the Denver Express and the California Limited between Chicago and Kansas City.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week

ending Jan. 11, amounted to 74,862 tons, against 94,499 tons during the preceding week, a decrease of 19,637 tons, and against 41,846 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JAN. 11.		WEEK TO JAN. 4.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	9,406	12.6	11,992	12.6
Wabash.....	6,219	8.3	7,926	8.4
Lake Shore & Mich. South.	11,496	15.1	13,776	14.6
Pitts., Ft. Wayne & Chicago	6,603	8.9	6,855	7.2
Pitts., Cin., Chi. & St. Louis	6,374	8.5	8,998	9.6
Baltimore & Ohio.....	4,461	6.0	6,279	6.6
Chicago & Grand Trunk.....	11,769	15.7	15,248	16.0
New York, Chic. & St. Louis	7,990	10.7	10,678	11.3
Erie.....	4,646	6.2	9,490	10.6
C., C., C. & St. Louis.....	5,901	8.0	3,327	3.6
Totals.....	74,862	100.0	94,499	100.0

Of the above shipments, 4,421 tons were flour, 44,359 tons grain and mill stuff, 8,116 tons cured meats, 9,734 tons dressed beef, 1,444 tons butter, 1,087 tons hides, and 2,474 tons lumber. The three Vanderbilt lines carried 38.4 per cent.; the two Pennsylvania lines, 17.4 per cent.

Northwestern Flour Traffic.

During 1895 both Minneapolis and Duluth-Superior mills passed all former records in flour grinding and the season has been the most prosperous of recent years. The records show (barrels):

	Minneapolis.	Duluth and Superior.
1895.....	10,581,635	3,508,050
1894.....	9,400,535	2,946,385
1893.....	9,377,635	2,108,115
1892.....	9,750,460	1,165,030

Prior to 1892 Minneapolis grinding was considerably less and Duluth did practically nothing. The direct shipments for four years have been:

	Minneapolis.	Duluth-Superior.
1895.....	3,080,945	1,076,340
1894.....	2,072,511	820,510
1893.....	2,877,277	513,205
1892.....	3,337,795

Of the Minneapolis product 4,000,000 barrels went through Duluth.

Duluth mills are now grinding comparatively little wheat, but Minneapolis is turning out large quantities. For the flour ground in Minneapolis and Duluth-Superior the past year over 63,400,000 bushels of wheat were required.

The Northern Pacific road has hauled 40,000 carloads of 1895 wheat chiefly to Duluth, and has in sight along its lines nearly 33,000 cars more. This road hauled about 40,000 cars of wheat raised in 1894.

Freight Traffic at Chicago in 1895.

A review of the traffic movement through Chicago for 1895 made on the basis of such statistics as are available shows the following general results as compared with the preceding year:

Receipts of flour were less in 1895 than in 1894, and the same is true of wheat. A larger percentage of the northwestern crop moved through the northern outlets to the seaboard than in 1894. Receipts of flour at Chicago were 1,000,000 barrels less than in 1894, with a corresponding decrease in shipments. Wheat receipts were some 5,000,000 bushels less than in 1894, while the receipts and shipments of wheat at Minneapolis are stated to have been the largest in the history of that city, excepting the year 1892, showing an increase of over 10,000,000 bushels. Both Minneapolis and Duluth show large gains in flour over 1894. Receipts of oats, rye and barley at Chicago increased somewhat, bringing up the totals on flour and grain. Receipts of corn were considerably less than in 1894, but the statistics on this commodity are not valuable as practically none of the new crop has begun to move yet.

Cured meat receipts were larger in 1895 by some 17,000 tons, while the dressed beef movement shows a considerable decrease. Receipts of butter were larger in 1895 than in 1894. The figures given by the Chicago Board of Trade on dressed beef are as follows:

	1895.	1894.
Receipts, (lbs.).....	109,351,714	136,476,783
Shipments, ".....	910,339,175	1,080,053,993

The advance figures given by the Union Stock Yards Company showing receipts and shipments of live stock for 1894 and 1895, are as follows:

	1895.	1894.
Receipts:		
Cattle.....	2,588,558	2,974,363
Calves.....	188,740	180,949
Hogs.....	7,885,833	7,483,278
Sheep.....	3,468,739	3,099,725
Horses.....	113,193	97,415
Shipments:		
Cattle.....	785,092	850,738
Calves.....	9,882	11,898
Hogs.....	2,106,613	2,465,058
Sheep.....	471,646	333,398
Horses.....	109,146	90,441

The aggregate shipments of flour, grain, provisions and lumber from Chicago eastward for the 52 weeks ending Dec. 28, as reported by the Board of Trade, were 3,099,102 tons. The quantities carried by each of the roads, with comparisons for the preceding year, appear as follows:

	1895.	P. c.	1894.	P. c.
Michigan Central.....	348,842	11.2	274,457	9.6
Wabash.....	284,102	9.2	269,765	9.4
Lake Shore & Mich. South.	411,717	13.3	379,734	13.2
Pitts., Ft. Wayne & Chi.	399,419	12.9	357,421	12.5
Pitts., Cin., Chi. & St. Louis	350,108	11.3	402,610	14.1
Baltimore & Ohio.....	226,816	7.3	186,732	6.5
Chicago & Grand Trunk.....	284,364	9.3	272,151	9.5
New York, Chicago & St. L.	317,579	10.2	308,702	10.8
Erie.....	348,935	11.3	308,416	10.7
Clev., Cin., Chicago & St. L.	123,220	4.0	102,682	3.6
Totals.....	3,099,102	100.0	2,862,070	100.0

Shipments for the two years were made up of the following articles (tons):

	1895.	1894.
Flour.....	155,787	189,092
Grain and mill stuffs.....	1,372,721	1,188,547
Provisions, lard, etc.....	569,744	485,747
Dressed beef.....	441,716	512,063
Flax seed.....	72,185	44,748
Grass seed.....	29,398	28,589
Broom corn.....	2,126	2,361
Butter.....	82,786	72,621
Cheese.....	11,730	13,041
Hides.....	71,083	51,204
Wool.....	45,047	24,063
Lumber.....	264,780	200,032
Totals.....	3,099,102	2,862,070